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pt. 33

PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

RAILWAYS.

A.D. 1803–1866.

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PREFACE.

The Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866 amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct inventions, and many of those filed under the new law of 1852 indicate various applications of the single invention to which the Patent is limited. Considering, therefore, the large number of inventions and applications of inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will, from time to time, become apparent, and be supplied in future editions.

This volume contains Abridgments of Specifications to the end of the year 1866. From that date the Abridgments will be found in chronological order in the "Chronological "and Descriptive Index" (*see* List of Works at the end of this book). It is intended, however, to publish these Abridgments in classes as soon as the Abridgments of all the Specifications from the earliest period to the end of 1866 have appeared in a classified form. Until that takes place, the reader (by the aid of the Subject-matter Index for each year) can continue his examination of the Abridgments relating to the subject of his search in the Chronological and Descriptive Index.

This series includes the inventions which relate to the *construction* and *arrangement* of railways and tramways. The improvements that may properly be referred to the establishment of a line of railway or of a tramway—with the exception of the buildings, rolling stock, and signals, which form the subjects of other volumes—are intended to be comprehended within the scope of the present work. It is true that in some cases improvements in signals are described, but these signals will invariably be found to be in combination with points, or to embody a principle common to both. Those bridges which are expressed, or are obviously intended to be designed or used for railways, are comprehended (other bridges are included in the series "Bridges, Viaducts, and Aqueducts"), and such adjuncts to the permanent way, as fixed tanks, water cranes, and troughs (but not pumps) for supplying water to trains, &c.

Improvements in rolling rails, moulding and casting chairs and sleepers, and in preserving wood for sleepers, &c., will be found included; and also a few inventions relating to excavating machinery of expressed or implied utility in railway works. The inventions relating to the construction of tunnels do not, however, come within the scope of the present series, but will appear in a volume now in course of preparation. Abridgments of specifications relating to portable railways are classed in this series, but only when these railways are distinct from the carriage which travels over them. Those which are attached to and travel with the carriage constitute a separate series. Inventions relating to atmospheric railways are, of course, included, and, of necessity, others, closely allied, for the conveyance of parcels, commonly known as the "pneumatic despatch."

The Abridgments marked thus (* *) in the following pages were prepared for another series or class, and have been transferred therefrom to this volume.

B. WOODCROFT.

January, 1873.

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INTRODUCTION.

PROBABLY the earliest account we have of the introduction of railways or tramways is to be found in the "Life of the Lord Keeper "North," in which work it appears that they were made use of about the year 1670 at Newcastle-on-Tyne, for transporting coal from the mines to the place of shipment on the Tyne. At that time the use of coal as a substitute for wood fuel, was rapidly increasing, and though the transport of the coal by sea was a comparatively easy matter, very great difficulty was experienced in getting it on board. It was no uncommon thing for mine owners to employ five or six hundred horses in the traffic, at great expense. As matters grew more serious, a good deal of consideration appears to have been given to the subject of communication, and ultimately wooden rails or trams were embedded in the road for the wheels to travel over. This was found to be so advantageous a practice that it speedily became fairly general, and an improvement was introduced by which a second tram or rail was laid on the first, so as to be removable when worn, and so to facilitate repairs and keep down expense. The next step was to nail thin metal plates of malleable iron upon the surface of the wooden rails wherever a steep ascent or a sharp curve rendered the draught more severe than usual, so that the friction should be reduced at those places. This advance was made, at least, as early as the year 1716.

It may be supposed that the saving of labour effected by means of the wooden railway was considered sufficient for the purpose to which it was applied, as it continued in use for many years without any important step being taken for the introduction of a more durable material. Some stoneways were constructed for similar purposes, but, though possessing many advantages, they did not succeed quite so well as the wood trams. The most material improvement was the use of cast-iron plates upon the wooden rails. It is somewhat remarkable that, notwithstanding the well-known effect of iron plates in diminishing resistance as already stated, this experiment appears to have been made more in consequence of accidental circumstances than as a premeditated measure of improvement. A wooden railway was in use at the Colebrook Dale Iron Works about the year 1767, when the price of iron became very low, and it was determined, rather than to blow out the furnaces, to cast bars which might be laid down on the wooden rails, and save expense in their repairs, and which bars, it was proposed, would be made available as pigs in case of a sudden rise in the market price. This plan was suggested by Mr. Reynolds, whose name is also worthy of remembrance from the fact of his having erected the first iron bridge in England. These bars or "scantlings of iron" as they were called, were five feet long, four inches broad, and one inch and a quarter thick, and were cast with three holes for the convenience of spiking to the wooden trams. This fact is mentioned in a letter from Hornblower to a Committee of the House of Commons, in which letter, however, he speaks disparagingly of railways as likely to "prove of greater "detriment than all the obstacles we have to deplore in the "present uncomfortable state of the roads." These remarks, however, had reference to what we should call tramways, and not railways.

The introduction of metallic surfaces to wooden rails was, however, at first productive of serious evils. As the resistance became less, the waggons of course ran more easily, and sometimes ended by running away altogether when the incline was more than ordinarily steep. Brake power, as then used, was insufficient, and so it came about that on such inclines the hitherto restive waggons were made to devote their superfluous energy to the useful task of dragging an "empty" from the bottom to the top.

Shortly after the experiment at Colebrook Dale, cast-iron rails with an upright flange, resembling in fact lengths of angle-iron, were brought into use. This change was effected in 1776 by Mr. Carr at the colliery belonging to the Duke of Norfolk, near Sheffield. Originally they were fixed upon cross sleepers of wood, but about the year 1793 blocks of stone were introduced as supports, instead of the wooden sleepers. These were, in the early railways, about a foot square, and eight or nine inches deep. From the use of flat rails, the next step was the introduction of edge-rails. The first edge railway of any considerable extent, was that completed in 1801 for the conveyance of slate from the quarries of Lord Penryhn, but the advantage of the new rails was speedily recognised by the coal-owners of Northumberland and

Durham, and within a few years they were extensively adopted. The Penryhn edge rail was introduced by Mr. Benjamin Wyatt, but it appears that he was not the first to see the desirability of substituting such a rail for those then ordinarily used, for in 1789 a Mr. Jessop introduced a cast-iron edge rail in the public road at Loughborough, the upper surface of which was flat and the under of an elliptical shape.

Up to this period of railway construction, cast iron had been the material in general use for rails, and much inconvenience was caused by their frequent breakage, especially in the case of those of the tram plate form. Bars of malleable iron were laid down as rails, to a limited extent, as early as 1808, but it was not until 1820 that the abolition of cast iron for rail making began to be anything like universal. In that year Mr. Birkenshaw, of the Bedlington Iron Works, obtained a patent for the manufacture of rails, entirely of malleable iron. It appears that Mr. Birkenshaw's attention was drawn to the subject by the perusal of a report by Mr. Stevenson, on the Edinburgh railway, in which report mention was made of the satisfactory working of malleable iron rails at Tindal Fell, in Cumberland, where about 3½ miles of railway had been constructed by Lord Carlisle. Experiments with these rails had also been made at Mr. Taylor's works at Ayr, and at Sir John Hope's at Pinkie. At this time some prejudice existed against malleable iron rails on account of their supposed liability to waste by rust. To settle this question, the agent of Lord Carlisle was applied to for the results of his experience. He wrote in May 1819, to Mr. Birkenshaw, "Our rails are one and a half "inches square, and stand upon stones about ten inches square, "and are placed at one yard distance from centre hole to centre "hole. Our railway carries four tons weight, and has never cost "us anything yet, as to the expense of the malleable iron, except "creasing. The iron I cannot see the least alteration with, "although it has now been laid eight years. The cast iron is a "daily expense; it is breaking every day."*

Birkenshaw's specification will be found abridged in its order in the present volume. It was a decidedly successful step in railway progress, and from the time of that invention rail-making became an established industry.

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* Some further particulars of the discussion on the value of wrought iron for rails will be found in "Wood's Practical Treatise on Railroads," chap. 2, sec. 6.

Although railways, or perhaps properly speaking tramways, were well known prior to 1822,* it was not until that year that the first public railway for the conveyance of goods, coal, and passengers was proposed. There had been instances of comparatively successful use of small railways worked by locomotives, as for instance the Killingworth and Hetton railways, but the Stockton and Darlington railway is justly looked upon as the starting point of the railway system. The idea of connecting Stockton and Darlington was not new. As far back as 1817 Edward Pease had projected a tramway, and even still earlier, in 1812, Rennie had been instructed to make a survey. But commercial troubles in the country put an end to the scheme. In 1818 the necessary preliminaries were taken to apply for an act to authorise the construction of a tramroad from Witton, a few miles above Darlington, to Stockton. The measure was opposed and thrown out. It was brought forward again, upon the basis of a new survey in 1819, but the king's death and the consequent dissolution of Parliament suspended the attempt. The bill was ultimately passed, and the royal assent was given to the first Stockton and Darlington Act on the 19th of April 1821. The Act did not contemplate the use of other than horse-power on the projected line, but after Mr. Pease had become acquainted with George Stephenson, and had engaged him as his engineer, he became convinced of the desirability of employing locomotives. Accordingly in 1823 the Amended Stockton and Darlington Act was obtained, and in it was inserted a clause, at Mr. Stephenson's desire, taking power to work the railway by means of locomotive engines, and to employ them for the haulage of passengers as well as of goods. This, Mr. Smiles says in his "Life of George Stephenson," was the first clause in any railway act empowering the employment of locomotives for the working of passenger traffic.

This railway practically settled the gauge which was subsequently generally adopted. In the gauge we have, curiously enough, the strongest link between the first tramroad and the railways of to-day. The gauge of the common country vehicles—which were first used on the tramroads—was 4 feet 8½ inches, and so the first tramroads were laid down to this gauge. The tools and machinery, says Mr. Smiles, for constructing coal waggons and locomotives were formed with this gauge in view. The Wylam waggon way, afterwards the Wylam plate-way, the Killingworth and the Hetton railways were all laid down to this gauge. Some of the earth waggons used in the construction of the Stockton and Darlington line were brought from the Hetton railway, and others which were especially constructed were built to the same dimensions, these being intended afterwards to be employed in the working of the traffic. Thus the chain is complete. The common country vehicle on the tramroad regulated the gauge of the Stockton and Darlington railway, and George Stephenson's first line has been the model for the most complicated railway system in the world.

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* The "Surrey railway"—a tramway from the Thames at Wandsworth to Croydon—was opened in 1805. It had a branch to Carshalton, and it was proposed to carry it on as far as Godstone. It was a plate railway of a gauge of 4 feet, used for the conveyance of coal, lime, and sand, &c. Its ordinary inclination was 1 in 120. It was worked by horses.

The Stockton and Darlington line was opened for traffic on the 27th of September 1825. The train consisted of six waggons loaded with coals and flour, a passenger coach filled with the directors and their friends, then 21 waggons fitted up with temporary seats for passengers, and lastly, six waggons loaded with coal, making in all a train of thirty-eight vehicles. The train, which was driven by Stephenson himself, reached Darlington, a distance of 8¾ miles, in 65 minutes. Some changes were made in the train, a band of music and numerous passengers were taken in and then the train set off again and reached Stockton in 3 hours and 7 minutes including the stoppages. By the time the train reached Stockton, there were about 600 persons in the train, or hanging on to the waggons, which Mr. Smiles points out, must have gone at a pretty safe and steady pace. The local chronicler states that "the arrival in Stockton excited a deep "interest and admiration."

Somewhat earlier than this the difficulties of conveyance between Liverpool and Manchester were the subject of continuous complaint. Cotton lay for weeks in Liverpool, and when ultimately manufactured in Manchester, could not be got away without much delay and trouble. The formation of a tramroad was the subject of some speculation in the two towns, but especially in Liverpool. Mr. James, a land agent and ironmaster went over to Liverpool and put himself in communication with the projectors. He and his brother-in-law Mr. Padly, made surveys under circumstances of great difficulty and considerable personal danger. This was in 1822. The project, however, slumbered for a time, but the year 1824 was speculative and the Liverpool and Manchester line was again talked about. It was hoped that in time the opposition offered by the land and canal proprietors would be overcome, but the interruptions in the conveyance of goods between the two towns became insupportable and rendered a remedy imperative. The formation of a third line of water communication was discussed, but as the existing canal proprietors had command of all the available water this was impracticable. These canal proprietors offered the most vigorous resistance to any change in the arrangements. They had a monopoly, their profits were enormous. The thirty-nine proprietors of the Old Quay were paid every other year for half a century, the total amount of their original investment, and the income derived from the Duke of Bridgewater's canal amounted to not less than 100,000*l*. a year.

So the railway seemed the only means by which the difficulty could be discharged, but people, and notably those interested in the canals, were incredulous, and the revised scheme they said, would no more be carried out than that put forward on the basis of Mr. James' survey. However a deputation from the two towns went to Darlington and Killingworth and witnessed the performances of Mr. Stephenson's engines. They returned and reported favourably and a company was got together to construct a double line of railway between Liverpool and Manchester. The first prospectus, a carefully prepared document, was dated the 29th of October 1824; the plans were prepared under the direction of George Stephenson and they were lodged for application to Parliament in the ensuing session. The resistance now fairly began. The canal proprietors banded together against the interloper and prepared at all hazard to crush it. They offered to make changes for public convenience, to use steam vessels and to shorten one of the canals. Lords Sefton and Derby, whose estates have been so much improved in value by the very railway, made common cause with the canal proprietors to prevent the passing of the railway bill. The surveys were interrupted by force and when they were at length completed every possible objection was taken. Plans were declared to be imperfect, levels erroneous, parks a mile distant were interfered with, danger, nuisance, and incompetence were all urged to defeat the promoters. Mr. Smiles gives an amusing catalogue of the imaginary objections to the railway. "It was declared that its formation "would prevent cows grazing and hens laying. The poisoned

"air from the locomotives would kill birds as they flew over
"them, and render the preservation of pheasants and foxes no
"longer possible. Householders adjoining the projected line
"were told that their houses would be burnt up by the fire thrown
"from the engine chimneys, while the air around would be
"polluted by clouds of smoke. There would no longer be any
"use for horses; and if railways extended, the species would
"become extinguished,* and oats and hay unsaleable com-
"modities. Travelling by road would be rendered highly
"dangerous, and country inns would be ruined. Boilers would
"burst and blow passengers to atoms. But there was always
"this consolation to wind up with—the weight of the locomotive
"would completely prevent its moving, and railways, even if
"made, could *never* be worked by steam power!"

The vote however was taken in committee, which in those days was open to every member to attend, were it solely for the purpose of voting upon the preamble or merely on a particular clause. The preamble of the bill was carried by a majority of *one*, seventy three members voting. Next day the clause empowering the company to make the railway was lost by a vote of 19 to 13. The clause to take land was also negatived, and the promoters then withdrew the bill.

Nothing daunted, within three days after the loss of the bill, the promoters called together their supporters and resolved to persevere. There was a little relaxation in the opposition, for the Marquis of Stafford, for himself and those of his family who were ultimately to benefit by the profits of the Bridgewater canal, took one thousand shares in the Liverpool and Manchester Railway Company, with the privilege of nominating three of the directors. Mr. Vignoles, in his address to the Institution of Civil Engineers in 1870, mentions this fact and expresses his belief that the arrangement grew out of communications opened by him between Mr. Bradshaw of Worsley Hall and the Liverpool committee. Mr. Vignoles made the acquaintance of Mr. Bradshaw involuntarily, having been brought before him on a pretended charge of night poaching, arising out of the moonlight surveying parties then common and necessary.

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* About the time of the opening handkerchiefs were sold, bearing representations of horses in a state of delight at the cessation of labour. They were represented frolicking about, and between whiles gazing complacently upon a train drawn by a high-chimneyed locomotive of the primitive type.

Early in 1826 the bill was again introduced into Parliament, under less discouragement. The opposition however was still very keen and it was only after a most careful fight that the preamble was passed by a majority of 43 to 18. The third reading was carried by a majority of 47. The bill passed the House of Lords almost unaminously, the Royal Assent was soon given, and on the 29th of May 1826, a general meeting of the subscribers was held in Liverpool, and the newly appointed directors held their first sitting on the following day. The cost of obtaining the Act amounted to the enormous sum of 27,000*l.*

The construction of the line commenced in June 1826 under the direction of George Stephenson, who was to have a salary of 1,000*l.* a year. Upwards of 200,000*l.* were expended in excavations and embankments; and in bridges alone, over and under the railway, upwards of 99,000*l.* Out of the total expenditure, amounting to 820,000*l.*, only the sum of 67,932*l.* was expended on the permanent way itself, the particulars of which as given by Mr. Booth, are as follows:—

	£	*s.*	*d.*
Rails for a double way from Liverpool and Manchester with occasional lines of communication, and additional side lines at the different depôts, being about thirty-five miles of double way, weight 35 lbs. per lineal yard = 3,847 tons, at prices averaging something less than 12*l.* 10*s.* per ton - - - -	48,000	0	0
Cast-iron chairs, 1,428 tons, at an average of 10*l.* 10*s.* - - - - -	15,000	0	0
Spikes and keys, to fasten the chairs to the blocks and the rails to the chairs - -	3,830	0	0
Oak plugs for the blocks - - -	615	0	0
Sundry freights, cartages, &c. - - -	487	0	0
	£67,932	0	0

The rails used on this line were five yards in length and weighed as has been said, thirty-five pounds to the yard. They were fish-bellied, single-headed, and supported every three feet upon stone blocks, each block containing nearly four feet of stone. Two holes, six inches deep and one in diameter were drilled into each block and into these were driven oak plugs. The cast-iron chairs were then firmly spiked down to the oak plugs. The rail was secured in the chair by a projection on one side of the rail web engaging in a groove in the chair, an iron key fitting in a recess on the other side forcing the projection on the web into the groove in the chair. The two lines of rails were separated by an interval of four feet. Eighteen miles of road were laid on stone blocks; the remaining fourteen, on embankments and the two moss districts, where subsidence might be expected, were laid on cross sleepers of timber. The following table gives some particulars of the levels and gradients on the line :—

	M.	Yds.	
Edge Hill Tunnel	1	240	Rise 1 in 48.
Level	3	1,000	Level.
To foot of Rainhill Plane	5	220	Fall 1 in 1,092.
Rainhill Incline	1	880	Rise 1 in 96.
Rainhill Level	1	1,540	Level.
Sutton Plane	1	880	Fall 1 in 96.
Parr Moss	2	880	Fall 1 in 2,640.
Do.	6	880	Fall 1 in 880.
Chat Moss	5	880	Rise 1 in 1,200.
To Manchester	4	880	Level.

In the construction of the railway there were excavated upwards of three million cubic yards of stone clay and soil, representing probably at least a weight of four million tons.

The public opening of the line took place on the 15th of September 1830, and the completion of the line being regarded as a national event, it was celebrated accordingly. The eight locomotives of the company, headed by the Northumbrian, driven by George Stephenson himself, went in procession with their trains, which accommodated altogether about 600 persons. Crowds of people congregated wherever the passing trains could be watched, and many of the passengers were provided with little flags which they were to hold out of the carriage windows to increase the effect.

The state carriage for the opening ceremony was a curiosity. It was coach-like in form, and covered with crimson cloth. The roof was contrived in such a way that, by means of a winch, it could be lifted somewhat for the purposes of ventilation. It was built by Mr. Edmundson, a furniture dealer of Oldham-street, Liverpool, and it was not a little admired at the time.

It is unnecessary here to dwell upon the particulars of the ceremonies or to do more than allude to the accident at Parkside, which threw a gloom over the day's proceedings. In Mr. Huskisson the company lost a valued friend and an earnest supporter of the project from its earliest inception, and his loss was perhaps felt as much by the country as in the town he ably represented.

On Saturday, the 14th of December 1830, the Planet driven by Mr. Stephenson, took the first load of merchandise over the railway from Liverpool to Manchester. The train consisted of 18 carriages, containing 135 bags and bales of American cotton, 200 barrels of flour, 63 sacks of oatmeal and 34 sacks of malt, weighing altogether 51 tons 11 cwt. 1 quarter. To this must be added the weight of rolling stock, tarpaulins, &c., viz., 23 tons 8 cwt. 3 quarters. The tender, water and fuel weighed about 4 tons, and the locomotive about 6 tons. Altogether, including the fifteen people in the train, the total weight could not have been short of 80 tons. The journey occupied 2 hours and 54 minutes, including three stoppages of five minutes. The assistance of a second engine was obtained on the Rainhill incline, which was passed at the rate of 9 miles per hour, the average rate on other parts of the road being about 12½ miles an hour. The success of the line was complete, but the anticipations of the projectors were to some extent at fault. They relied upon the goods traffic for the chief receipts, whereas it was found that the passenger traffic far exceeded it in value. In the evidence given before the Committee of the House of Commons, the promoters stated their expectation of obtaining about one-half of the whole number of passengers that the coaches then running could take, which was from 400 to 500 a day. But the railway was scarcely opened before it carried an average of 1,200 passengers a day, and five years after the opening, it carried nearly half a million of persons yearly.

When the commercial success of the Liverpool and Manchester railway became established, numerous projects for other lines were brought before the public. The first lines which were actually constructed subsequently to the opening of the Liverpool and Manchester, were in connection with it, and principally in Lancashire. One branch—that to Runcorn Gap and Warrington—it was thought might be extended to Birmingham with advantage. A scheme for uniting Birmingham with London was also brought forward, and thus it was contemplated to bring the north-western counties into direct railway communication with London, by what is now the London and North-western railway. Mr. Brunel came forward to engineer a projected line between London and Bristol;* Mr. Braithwaite similarly took the London and Colchester line, while Mr. Francis Giles attached himself to the Newcastle and Carlisle, and London and Southampton projects. Discussions also commenced with regard to the gauge. Mr. Brunel, backed by his company, declared firmly in favour of a seven foot gauge and Mr. Braithwaite on the Eastern Counties chose five feet. The inconvenience arising from this difference of opinion and practice soon became excessive. On the Eastern Counties the gauge was altered, at the advice of Robert Stephenson, with the subsequent approval of Mr. Braithwaite. Mr. Brunel also adopted the narrow gauge on the Genoa and Turin railway, though for a long time the English company were resolute in their adherence to the seven foot gauge. In Ireland a peculiar gauge of five feet three inches was adopted, but in the case of the Ulster Railway, twenty-five miles were laid to a gauge of six feet, on the recommendation of the Irish Railway Commission, while the Drogheda line, which was the link between Dublin and the Ulster line was laid to a gauge of five feet two inches. General Pasley, struck an average, and fixed five feet three inches!

Having thus given a general and in many respects imperfect view of the deduction of railways from the early rude attempts to the present practical system, it will be necessary to make some allusion to the atmospheric system. The idea of propelling by atmospheric pressure originated with Papin, but it never assumed any substantial existence until revived by Mr. Medhurst in 1810. He published a pamphlet to show the practicability of conveying letters and goods in this way. In 1824, Mr. Vallance of Brighton, proposed to project passengers through a tube large enough to contain a train of carriages, the air being exhausted in front of the train. The same idea was subsequently taken up, in 1835, by Mr. Pinkus. Mr. Smiles has given some interesting particulars of the introduction of atmospheric propulsion, in his life of George Stephenson. He says that many scientific gentlemen, Dr. Lardner and Mr. Clegg amongst others, advocated the plan, and an association, with a capital of 18,000*l.*, was got together.

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* The Great Western Railway was opened to Maidenhead, a distance of nearly twenty-three miles, in June 1838, and to Twyford, eight miles further on, in July 1839. The line from Twyford to Reading was opened in March 1840, and from Reading to Chippenham by May 1841. Meanwhile the portion from Bristol to Bath had been opened in August 1840. The last division, namely, that from Chippenham to Bath, containing the Box tunnel, was opened on June 30, 1841, and the railway was completed throughout its whole length.

Mr. Vignoles took his friend Mr. Stephenson to see the model, and after carefully examining it, the latter gentleman observed emphatically, "*it wont do*, it is only the fixed engine and ropes over again, in another form." He thought the principle could not stand the test of practice and it would not pay. After all, he said, it was only a modification of the stationary engine plan, and every day's experience was proving that fixed engines could not compete with locomotives in point of efficiency and economy.* He stood by the locomotive engine, and subsequent experience proved that he was right.

Messrs. Clegg and Samuda afterwards, in 1840, patented their plan for an atmospheric railway, and they publicly tested its working on a length of about half a mile on the West London (formerly the Thames Junction) railway at Wormholt Scrubs. The propelling tube was of iron, nine or ten inches in diameter laid on an incline rising about 1 in 115 or 120. The results of the experiments were so satisfactory that the Directors of the Dublin and Kingstown line adopted it between Kingstown and Dalkey a short extension, about 1¾ miles, of the main line. The London and Croydon Company also adopted the atmospheric principle; and their line was opened in 1845. The new mode of propulsion was now very popular, but Mr. Stephenson was still very loyal in his adherence to the locomotive. Mr. Brunel approved of the atmospheric system, Mr. Cubitt, Mr. Vignoles, and many other distinguished men were of the same views. It was pretty clear then that Stephenson must be prejudiced, and that the locomotive stood no chance.

The atmospheric system was fully and fairly tried, and it was found wanting. It was admitted to be an exceedingly elegant mode of applying power, but it was costly, irregular in action and consequently not to be depended upon. "At best it was but a " modification of the stationary engine system, which experience " had proved to be so expensive that it was gradually being abandoned in favour of locomotive power. In fact Mr. Stephenson's " first verdict, "It wont do" proved correct, and by the end of " 1848, the whole of the atmospheric tubes were pulled up— " including Mr. Brunel's immense tube on the South Devon

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* It will be remembered that the Blackwall railway was worked by stationary engines and ropes; carriages being detached at each station by slipping. The gauge of this line was 5ft. 0in. It was in part opened in 1840.

"railway—to make room for the locomotive engine."* Atmospheric propulsion is still however turned to good purpose, notably in Rammell's Pneumatic Despatch and in the perfect system contrived by Mr. Siemens for the telegraphic and postal service in London.

It has been found impossible to do more than give a very slight outline of railway history in this introduction. Many interesting topics and cardinal points have been necessarily passed over, and the parts that some of the leading inventors have played in the perfecting of the railway must be gathered from the remainder of the volume.

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* One of the greatest practical difficulties the supporters of the atmospheric system had to contend with, was to keep the valve in good order. The weather acted upon it most injuriously, and men were appointed to follow each train with pots of grease to assist its action. But there were other enemies besides the weather. Field mice in hordes came down to the lines to feed upon the grateful diet of greasy leather, and nothing could keep the valve tight.

RAILWAYS.

RAILWAYS.

A.D. 1803, February 28.—N° 2682.

WOODHOUSE, Jonathan.—"A new method of forming a cast-iron rail or plate which may be used in making iron railroads or ways for the working and running of waggons, drays, and other carriages on public and other roads; and also a new method of fixing, fastening and securing such cast-iron rail or plate on such roads."

"The rail or plate is made of cast iron, and the upper part or surface thereof is concave, the width of which rail or plate may be increased or diminished as may best suit the size of the wheels of the carriages that may be worked upon the particular roads where the rails or plates are used. The method of fixing, fastening, and securing the cast-iron rails or plates is to place them on bearings at convenient distances which are to be fixed firm and solid in the earth, and to fasten the rails or plates to such bearings with wrought-iron screws or cutter bolts, the bearings for the rails or plates may be made of timber, stone, cast-iron, or wood piles, and if the rails or plates are properly fixed to such bearings with wrought-iron screws or cutter bolts, and the road is made even with the surface of the external or outer edges of the rails or plates, either with stone, gravel, or wood, or any other road materials, the rails or plates will be immovable, and the wheels of the carriages used thereon will pass over the same with facility, and by reason of the concave form and manner of fixing of the said rails or plates no shock which they can receive (except some wilful force is maliciously used) can injure or break them."

[Printed, 1*s*. Drawing. See Repertory of Arts, vol. 3 (*second series*), p. 15; Engineers' and Mechanics' Enclyclopædia, vol, 2, p. 383; Rolls Chapel Reports, 6th Report. p. 202.]

A.D. 1811, March 4.—N° 3405.

GUPPY, Sarah, and GUPPY, Samuel.—"A new mode of constructing and erecting bridges and railroads without arches

“ or sterlings, whereby the danger of their being washed away by “ floods is avoided.”

The invention is thus described by the inventor :—

“ On each side of the river or place over which a bridge or road “ is to be constructed, pursuant to my said invention I do fix “ or drive a row of piles, with suitable framing to connect them “ together, and behind these I do fix, or drive, and connect, other “ piles or rows of piles and suitable framing, or otherwise, “ upon the banks of the said river or place, I do dispose or build “ certain masses of connected masonry or other ponderous structures, “ with piles or without, in order and to the end that the “ said piles or masonry, or other structures, shall be capable of “ sustaining and permanently resisting the action of a considerable “ force applied or exerted in directions tending to bring the “ same together; and I pass across the said river or place, from “ the upper or other convenient part of the said piles or masonry “ or structure, several strong metallick chains, parallel to and at “ suitable distances from each other, which said chains may be “ drawn tight by secure mechanical means ; or otherwise the said “ chains mny be suffered to hang in similar lines, slightly curved, “ from the one side or bank to the other, and in either case I do “ dispose upon the said chains longitudinally and crosswise, “ such fit pieces of timber, or iron, or other suitable material, as “ shall and may constitute a platform, which, by the connection “ or disposition of the materials thereof, shall afford a proper “ support for a road or pavement of the usual structure, or for “ railroads, which last, namely, the railroads, upon such occasions “ as may require the use and application of my said invention, I “ do connect, unite, and frame together with each other and with “ the chains herein-before mentioned and described.”

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 19 (*second series*), p. 215; Rolls Chapel Reports, 8th Report, p. 83.]

A.D. 1811, April 10.—N° 3431.

BLENKINSOP, John.—“ Certain mechanical means by which “ the conveyance of coals, minerals, and other articles is facilitated, “ and the expence attending the same is rendered less than “ heretofore.”

The inventor proposes to make a railway having, in addition to the smooth rails, a cogged or toothed rack, with which the driving wheels are to engage. The rack may be so continued as to be used with a vertical or with a horizontal wheel. He also, "as "may be most convenient," avails himself "of the contrivances "and expedients heretofore used for improving roads, such as "platforms, pavements, connected timbers," &c.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 21 (*second series*), p. 138; Register of Arts and Sciences, vol. 4, p. 441; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 395.]

A.D. 1812, December 30.—N° 3632.

CHAPMAN, WILLIAM, and CHAPMAN, EDWARD WALTON.—"A method or methods of facilitating the means and reducing "the expence of carriage on railways and other roads."

The invention consists "in the use of a chain or other flexible "and continuous substance stretched along the road to be travelled, properly secured at each end and at suitable intervals, "and in the application of this chain round or partially round a "barrel or grooved wheel in such a manner as not to slip; when "this grooved wheel, which is fixed upon, before, or behind, "a carriage supporting or containing any internal self-moving "power, shall be put in motion by the said power, so that by the "revolution of the barrel or grooved wheel round its axis, either "one way or the other, it shall necessarily draw the said carriage and any others which may be attached to it within its "powers of action. . . . As the carriage containing the "motive power will, thus loaded, be too heavy in various cases "for the strength of the existing iron or wooden rails resting on "four wheels only," the inventors so arrange for such ways "that it may rest equally and more freely round curves or "angles either on six or eight wheels so as to reduce its pressure "on each in the inverse proportion of its number of wheels."

The inventors also describe a method of using "an endless "chain of limited length for travelling an unlimited distance."

[Printed, 1*s*. 2*d*. Drawings. See Repertory of Arts, vol. 24 (*second series*), p. 129; also vol. 26 (*second series*), p. 161; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 396.]

A.D. 1815, November 14.—N° 3959.

DE BAADER, JOSEPH.—"An improved plan of constructing "railroads, and carriages to be used on such improved railroads, "for the more easy, convenient, and expeditious conveyance of "all sorts of goods, wares, merchandise, persons, and all other

" articles usually or at any time removed in carriages of any con-
" struction whatever."

The inventor places the rails from twenty-four to five inches apart, or he makes but one single line of rails, and causes the men, horses, or other animals employed for drawing the carriages to walk without and on one side of the said double or single line of rails, or on both sides of them if more than one animal be " employed, thus the rails are made to occupy a smaller space.

"The rails are fixed upon and supported by a proper foundation " of stone or wood upon blocks, pillars, or posts, placed at proper " distances, but a good deal more elevated above the ground than " in the usual way, that is to say, from five to ten inches and " upwards, and the plates of the said rails are quite flat, having " no edge or rising projection on their upper surface, which is " but a little broader than the wheels of the carriages that are to " run upon them," by which means the rails are always kept clear.

The plates of the rails are provided " with a vertical or inclined " rest or support below, cast or joined in one piece with them, " which forms a lateral line of rails, the flat or plain surface of " the upper rails or plates projecting a little on each side of the " said lateral plates or supports."

The inventor also proposes to elevate his rail as much as two feet, but " in particular cases where this elevated conveyance may " be impracticable, on account of the great weight of the loaded " carriages, or for any other reason, and where, of course, the " line of railway must be interrupted for a considerable length," he provides carts or waggons with platforms, upon which two or more of his railway carriages " can be placed as upon a moveable " bridge, and transported by as many horses as will be found " necessary, upon the common road or pavement, to the point " where the continuation of the railway begins on the other " side."

Cross roads may be passed by bridging, or the carriages may be carried across by a species of travelling crane.

"For cross roads, upon which the traffic is not very consider- " able, the main railway can be carried on in one uninterrupted " line and level, and an occasional and temporary passage over " the same may easily be established by small swing bridges or " drawbridges. . . . . . Or two pieces of the iron rails may " at any such place be made moveable upon pivots, to be lifted

" up or turned aside in order to form a temporary opening for the " passage of carriages which come across." As the carriages upon the inventor's railways, " if properly constructed, move so " easily that with the least uniform declivity of the rails they will " run by themselves," he lays down the railways, in certain cases and situations, " with such a gentle and equal declivity for " the length of one hundred or more hundred yards, and at the " end of each such declivity, when the rails are arrived nearly at " the level of the ground," he elevates the same at once to the " perpendicular height of three, four, or more feet, by means of " an inclined plane, from the summit of which the line of the " railway is continued, with the same gentle declivity, to a similar " distance," and thus the inventor proposes to utilize the force of gravity.

In some cases and situations he proposes to make use of the power of wind for propulsion upon the said improved railroads, or to assist and accelerate the movement of carriages by means of a small sail put up occasionally.

[Printed, 4*d*. No Drawings. See Rolls Chapel Reports, 8th Report. p. 111.]

A.D. 1816, September 30.—No. 4067.

LOSH, William, and STEPHENSON, George.—" A method " or methods of facilitating the conveyance of carriages and all " manner of goods and materials along railways and tramways, " by certain inventions and improvements in the construction of " the machine, carriages, carriage wheels, railways, and tram- " ways for that purpose."

The invention relates to edge, round-topp'd, fish-backed, plate, tramway plate, and barrow-way plate rails. The inventors say :— " In the construction of our edge railways our objects are, to fix " both the ends of the rails, or separate pieces of which the ways " are formed, immoveable in or upon the chairs or props by which " they are supported ; . . . . . to place them in such a " manner that the end of any one rail shall not project above or " fall below the corresponding end of that with which it is in " contact, or with which it is joined ; . . . . . to form the " joinings of the rails with the pedestals or props which support " them in such a manner that if these props should vary from " their perpendicular position in the line of the way the joinings " of the rails with each other would remain as before such

" variation, and so that the rails shall bear upon the props as " firmly as before. The formation of the rails or plates, of which " a plate railway consists, being different from the rails of which " the edge railways are composed, we are obliged to adopt a " different manner of joining them, both with each other and " with the props and sleepers on which they rest; but in the " joining these rails or plates upon their chairs and sleepers we " fix them down immoveable, and in such a manner that the end " of one rail or plate does not project above or fall below the end " of the adjoining plate, so as to present an obstacle or cause a " shock to the wheels of the carriages which pass over them; and " we also form the joinings of these rails or plates in such a " manner as to prevent the possibility of the nails which are " employed in fixing them in their chairs from starting out of " their places from the vibration of the plates, or from other " causes."

The patentees also describe improvements in the construction of railway wheels and locomotive engines.

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 30 (*second series*), p. 321; Register of Arts and Sciences, vol. 4, p. 446; Engineers' and Architects' Journal, vol. 10, p. 113: Engineers' and Mechanics' Encyclopædia, vol. 2, p. 402; Webster's Reports, vol. 1, pp. 199 and 200.]

A.D. 1817, August 5.—N° 4149.

HAWKS, JOHN.—"A new method of making iron rails to be " used in the construction of railways."

The inventor says:—"Instead of making the rails or bars of " cast or malleable iron, as those now in use are, they are a compound " of malleable and cast-iron so connected as to be " stronger than if made of either kind alone." "The surface is " formed of cast-iron, and the back or under part of malleable " iron, joined together, and formed when the metal of the former " is in a fluid state."

"The modes of combining cast and malleable iron together in " the rails are various, but that which I prefer as affording the " best security for their being firmly affixed together is by running " the cast-iron, when in a state of fusion, on the malleable " iron, to effect which the malleable part must first be forged or " otherwise prepared in that form and of that strength which the " nature of its intended purpose or appropriation points out as " most proper. Such part of it as is intended should be immerged

" or adhered to the cast iron, should be rendered rough and " uneven by jogging, or by perforation, or by giving it a dovetail " form, or by any other means, so that the cast-iron may affix " and firmly adhere thereto without the liability of becoming " loose by jerks of the wheel, or wheels occasioning vibrations, &c. " The malleable part must be clean, warm, or at least perfectly " dry, when laid in the mould to receive the melted iron, which " should be poured in as soon as possible after the mould is ready " to receive it, as any damp on the malleable iron will endanger " the soundness of the cast-iron part."

[Printed, 4*d*. No Drawing. See Repertory of Arts, vol. 38 (*second series*), p. 17; Engineers' and Mechanics' Enclyclopædia, vol. 2, p. 409; Rolls Chapel Reports, 7th Report, p. 118.]

A.D. 1820, October 23.—N° 4503.

BIRKINSHAW, JOHN.—" Certain improvements in the manufacturing and construction of a wrought or malleable iron railroad or way."

The invention consists " in the adaptation of wrought or malleable iron bars or rails of a peculiar form instead of cast-iron rails " as heretofore. From the brittle nature of cast iron it has been " found by experience necessary to make the bars of a railroad " sufficiently strong to bear at least six times the weight intended " to be carried along the road, by which the original cost of a " railroad was considerably augmented, or if light rails were used " the necessity of frequent repairing entailed a heavy expense " upon the proprietors." To obviate these objections a bar is made of wrought or malleable iron. The rails or bars "are " formed as prisms, though their sides need not of necessity be " flat."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 39 (*second series*), p. 206; London Journal (*Newton's*), vol. 2, p. 9; Engineers' and Mechanics' Encyclopædia, vol. 2, pp. 411 and 552.]

A.D. 1821, September 14.—N° 4591.

LOSH, WILLIAM.—" Certain improvements in the construction " of iron rails for railroads."

The improvements consist " in fixing bars of malleable iron " on the upper surface of a line of cast-iron rails or malleable iron " rails of whatever form; such rails may be in the longitudinal " direction of the rails when laid, so as to form an uninterrupted " line the whole length of the bar, which may be as long as it

" shall be found convenient and economical to use, and of the " same breadth as the upper surface of the rails to which it is " fixed, or a little broader or narrower."

In some cases is fixed " a band or strap of malleable iron to the " under surface of rails made of cast-iron, in order that such band " or strap may by its power of tension give support to the cohesion " of the parts of the cast-iron rail, and admit of its being made " lighter."

The inventor also claims as an improvement " a rail formed by " placing two bars of malleable iron on their sides or edges, and " fixing them in that position by bolts and studs, or by any other " convenient method, and on their upper edges placing and fixing " a flat bar of malleable iron, or one which is slightly curved or " rounded at the edges, to diminish friction, so that the bar or " plate placed and fixed on the upper edges of the two malleable " iron bars shall form the surface upon which the wheels of the " waggon or carriage are to revolve."

Methods of constructing these rails are described by the inventor.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 41 (*second series*), p. 197; London Journal (*Newton's*), vol. 3, p. 242; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 413.]

A.D. 1821, October 24.—N° 4602.

THOMPSON, Benjamin.—" A method of facilitating the con- " veyance of carriages along iron and wood railways, tramways, " and other roads."

The invention consists in " the reciprocal action of two engines " standing at the extremities of a stage or portion of road to be " travelled over, one engine drawing the carriages forward in a " direction towards itself, and along with them a rope from the " other engine, which rope in its turn pulls the same or other " waggons by means of the other engine back again, and also a " rope therewith; thus, by the alternately active and passive " agency of two ropes, are the powers of fixed engines made to " act in opposite directions, thereby causing a road to be traversed " both ways by loaden or empty carriages, and at any desired " speed. It is the reciprocal and interchangeable application of " power " which is claimed as the invention.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 40 (*second series*), p. 205; London Journal (*Newton's*), vol. 3, p. 65; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 416.]

A.D. 1821, November 22.—N° 4618.

PALMER, Henry Robinson.—"An improvement or improvements in the construction of railways or tramroads, and of the carriage or carriages to be used thereon."

The nature of the improvements consists "in the substitution of a single line of rail instead of the double lines of rails commonly used, supported at such a height from the surface of the ground as to allow of the centre of gravity of the carriage or carriages to be used thereon . . . . being below the upper surface of such line of rail." The method of constructing such line of rail is to fix or set up a series or row of posts, piles, or pillars, at the distance of about nine feet from each other, in the course or line of the intended road, "whose altitudes above the surface of the ground are such as to terminate at their upper extremities in or nearly in a plane parallel to the intended plane of the road."

The posts or pillars may be made of any material of which such articles are usually composed, but the patentee recommends constructing them of cast iron.

In order that the carriages may pass from one line of rail to another a portion of the rail is jointed forming a long switch bar or swing rail and is moved with a carriage upon it.

The patentee also describes such swing rail with a carriage resting upon it centred and turning upon one of the supporting pillars, answering the purpose of a turntable. "In order to cross a public road, the rail being at such a height that carriages could not pass under it," the inventor says, "I should form that part of the rail which is intended to cross the said public road in the manner of a turnpike-gate." When the gate is shut the top part forms a continuation of the line and fills up the gap caused by the road.

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 1 (*third series*), p. 129; London Journal (*Newton's*), vol. 5, p. 157; and vol. 10, p. 32; Mechanics' Magazine, vol. 27, p. 394; Register of Arts and Sciences, vol. 1, pp. 97 and 131; vol. 2, pp. 150 and 353; vol. 3, p. 141; vol. 4, p. 219; also vol. 1 (*new series*), p. 9; and vol. 4 (*new series*), p. 25; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 615; also vol. 2, p. 425.]

A.D. 1823, April 16.—N° 4777.

GRAULHIE, Gerard.—(*Partly a communication.*)—"A machine or apparatus upon a new and portable construction,

" capable of being inclined in different degrees, adapted to the " conveyance of persons and goods over water or ravines for " military or other objects, and applicable also to purposes of " recreation and exercise."

According to this invention jointed or flexible tables are supported upon frames and posts, and the road so made is capable of being placed at various inclinations. "Ways" are "fixed to " the tables on each side to connect together the boards forming " each table, and likewise to direct the wheels of the cars running " on the connected tables, and to prevent any side motion of " the said tables, bareface tenons or rabbets are formed at the " end of each way, so as to join half of the ways of one table to " half of the ways of the next table, without destroying their " flexibility, or their backward or forward motion, and also " moveable ways at the bottom of the descent to turn the cars " off the machine when it is necessary for them to stop."

[Printed, 8*d*. Drawings. See London Journal (*Newton's*), vol. 7, p. 180.]

A.D. 1824, February 19.—N° 4905.

VALLANCE, John.—" A method of communication or means of " intercourse by which persons may be conveyed, goods trans- " ported, or intelligence communicated from one place to another " with greater expedition than by means of steam carriages, steam " or other vessels, or carriages drawn by animals."

The means proposed for carrying out this invention is a hollow tube or cylinder. This cylinder reaches from one to the other of the places between which communication or intercourse is to be made. The tube is composed of cylindrical pieces about twelve feet long, six feet diameter, and one inch and a quarter in thickness and bored out truly cylindrical. They are laid and embedded in masonry, and carried over rivers on bridges; at the joints to make them air tight they are hooped round, a quarter of an inch being left as room for expansion. A piece of cast iron is fixed along the bottom of the cylinder to form a groove, channel, or track for a wheel to run upon similar to those of a railway. A hollow cylinder or piston made of framework about twelve feet long is placed inside the tube with a wheel in the centre intended to run in the groove or channel inside the tube. By this combination of apparatus persons may be conveyed or goods transported from one place to another by being placed inside the piston or travelling vehicle which is moved by forcing air in behind it or exhausting air from before it by an arrangement of valves and air pumps. The patentee also describes a plan of signal communication from a distance by the agency of water in a pipe, also means of registering and measuring impulses given to the column of water in the pipe.

[Printed, 1*s*. 6*d*. Drawing. See Repertory of Arts, vol. 1 (*third series*), p. 52; London Journal (*Newton's*), vol. 10, p. 113; and vol. 12, p. 151; Mechanics' Magazine, vol. 6, pp. 338 and 426; vol. 7, pp. 15, 36, 53, 167, 194, 251, 307, 367, 377, and 412; also vol. 8, pp. 11, 35, and 68; Register of Arts and Sciences, vol. 1, pp. 281 and 292; vol. 2, p. 325; also vol. 4, p. 327; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 32.]

A.D. 1824, February 28.—N° 4913.

JAMES, William.—" Certain improvements in the construction " of rail and tram roads or ways, which rail or tram ways or roads " are applicable to other useful purposes."

The invention consists in " making the rails hollow of any " form that may be desired . . . . in producing a rail with a " double roadway, to be firmly fixed as the centre of two lines of " railway, thereby saving one rail in four;" also " in affording " the means of conducting water, gas, or other fluids from place " to place through the hollow tube of the rail;" and " in employ-" ing the hollow rail as a trunk to receive ropes, chains, or rods " passing from a standing engine or other machine, for the " purpose of protecting them from external injury;" and finally, " in attaching to such rail or tram ways certain rods, wheels, and " endless chains, for the purpose of drawing carriages allong the " said railway by means of standing engines."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 1 (*third series*), p. 184; London Journal (*Newton's*), vol. 9, p. 191; Register of Arts and Sciences, vol. 2, p. 241.]

A.D. 1824, December 18.—N° 5060.

SNOWDEN, William Francis.—" A wheelway and its carriage " or carriages, for the conveyance of passengers, merchandize, " and other things along roads, rail and other ways, either on a " level or inclined plane, and applicable to other purposes."

The " wheelway consists of a hollow trunk within which a " machine is to travel " called a " mechanical horse." " To this " is attached a horizontal toothed wheel, taking into the teeth of " a rack placed sideways along the whole length and within the

" trunk, and which toothed wheel being made to revolve by a " steam engine or other power, will cause the mechanical horse " to be propelled and by proper attachments to draw tram " carriages forward upon a platform or road laid along the top " of the trunk." The power to drive the "mechanical horse" travels with the tram carriages.

This principle may be adapted to towing purposes by erecting " such wheelways upon strong standards by the canal or river " side." In this case the "mechanical horse" is suspended from the rails and the conductor travels with it, and he, by turning a winch propels it. A rope connects it with the barge or vessel to be towed.

[Printed, 1*s*. 10*d*. Drawings. See London Journal (*Newton's*), vol. 10, p. 337, and vol. 11, p. 148; Mechanics' Magazine, vol. 21, p. 177; Register of Arts and Sciences, vol. 3, p. 193; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 462.]

A.D. 1825, March 5.—N° 5117.

JAMES, William Henry.—" Certain improvements on rail- " ways, and in the construction of carriages to be employed " thereon."

This invention consists "in forming the rails at those parts of " the road where curves or turns are to be made, with ribs of " different elevations, and adapting grooves of different diameters " on the peripheries of the carriage wheels to run upon these " rails, so as to cause the two opposite wheels on the same axle " of the carriage to vary in their circumferences at those parts " of the rail where the carriage has to turn, and consequently to " run in curves instead of straight lines."

[Printed, 8*d*. Drawings. See Repertory of Arts, vol. 2 (*third series*), p. 59; London Journal (*Newton's*), vol. 10, p. 301; Register of Arts and Sciences, vol. 4 (*new series*), pp. 126 and 137; Engineers' and Mechanics' Encyclopædia, vol. 2, pp. 457 and 465.]

A.D. 1825, March 30.—N° 5142.

PARKIN, Thomas.—" A mode of paving in a certain manner " parts of public roads, whereby the draught of waggons, carts, " coaches, and other carriages is facilitated."

Part of the improvements refer to the construction of a tram-road. Cast-iron plates, in lengths of "thirty feet, more or less, " according to the nature of the situation and ground," are secured on rows of stones, by screw bolts with countersunk heads.

Other methods of making tramways by securing blocks of stone together in rows are described.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 2 (*third series*), p. 193; London Journal (*Newton's*), vol. 11, p. 347; Register of Arts and Sciences, vol. 3, p. 345; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 610.]

A.D. 1825, April 2.—N° 5145.

FISHER, JACOB JEDDERE.—"A new application of railways, " and the machinery to be employed thereon."

The principle of this invention is that of "a railway of suspension, " which can be hung or supported from the upper part " of the same to any proper means of suspension, instead of being " supported from below."

The inventor claims "any construction of railway and carriage " to run upon them which will admit of the bodies to be carried " being suspended immediately underneath the railway, while " such railway is supported from above, and its two side plates " upon which the carriage wheels run are not independent of " each other, but are fixed to the stock plate or frame from which " the suspension takes place, so that the said two side plates " shall not be independent of each other, and thereby liable to " get out of adjustment to each other."

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 11, p. 98; Register of Arts and Sciences, vol. 3, p. 263; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 467.]

A.D. 1825, April 12.—N° 5148.

BRANDLING, ROBERT WILLIAM.—" Improvements in the " construction of railroads, and in the construction of carriages " to be employed thereon and elsewhere."

"To enable carts to travel both upon railroads and common " roads, and to leave the former, and return upon them at any " angle, this is done by means of elevators cast upon the rail, or " made separate of iron or any other hard substance, by single " double, and triple tyred wheels and scrapers, with socket joints " and springs, and by moveable shafts with liberating joints."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 2 (*third series*), p. 205; London Journal (*Newton's*), vol. 11, p. 367; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 468.]

A.D. 1825, May 10.—Nº 5160.

HILL, THOMAS, the younger.—" Certain improvements in the " construction of railways and tram roads, and in carriages to be " used thereon, and on other roads."

The invention consists in " substituting cast-iron pipes instead " of rails or bars for railways, and for a cheap and improved " method of laying railways with malleable iron bars; also for " diverting the main line of railways and tramroads at the passing " places or turn-outs."

" The pipes may be of various lengths, from three to twelve " feet, and from two to four feet diameter, and laid in iron, stone, " brick, or wood sleepers, hollowed out to form a socket one-half " the depth of the diameter of the pipe, and may be pinned down " or not, as they will fasten by use."

A railway of malleable bars of iron " is laid in an easy and " simple manner, and at a cheap rate, upon pedestals or sleepers " of iron, stone, brick, or wood alternately, twelve and nine " inches square, at the distance of three feet, and six to twelve " inches or more deep, to be grooved for the reception of the bar " one inch deep on the back or outside, and half an inch on the " inside of the bars to be pinned down."

The inventor curves the main line slightly—about 1 in 50—from the turn out or siding. " This method lessens the friction, " and makes the turn-outs easier; but this deviation may be " varied from one to four feet " in 50 yards.

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 12, p. 365; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 468.]

A.D. 1825, June 14.—Nº 5185.

LINDSAY, JOHN.—" Certain improvements in the construction " or formation of the horse and carriage ways of streets, turnpike " and other roads, and an improvement or addition to wheels to " be used thereon."

In constructing a railway for a public road, triangular rails of wrought iron, in about ten feet lengths, are laid on rows of granite blocks. The ends of the bars are bent downwards at right angles and let into the blocks, wherein they are secured by melted lead. Cogged rails may also be used. These are of cast iron and are similarly secured, the projections being cast on the plates or bars, instead of the latter being bent.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 2 (*third series*), p. 260; London Journal (*Newton's*), vol. 11, p. 96; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 610.]

A.D. 1825, October 13.—N° 5267.

EASTON, JOSIAH.—"Certain improvements in locomotive or " steam carriages, and also in the manner of constructing the " roads or ways for the same to travel over."

The improvement in the manner of "constructing the roads or " ways for locomotive or steam carriages, or other carriages to " travel over; consists in forming such roads or ways with blocks " or masses of stone suitably bedded upon a solid foundation, in " the manner of masonry, in order to form two parallel paths at " a proper distance asunder, and sufficiently firm to sustain the " wheels of the locomotive or steam carriages; and broad flat bars " of wrought iron are bedded upon the stonework and fastened " down thereto in the proper tracts for the wheels to run upon, " but without forming any projecting sides or flanges, either on " the wheels or on the bars, which can occasion dirt or snow to " lodge and accumulate thereon, and cause obstruction to the " passage of the wheels. But to retain the wheels of the carriage " from quitting or deviating laterally from the said iron bars or " tracks, a range of block of stone is laid and fixed along the " centre of the road or way, so as to form an eminence in the " middle between the two tracks for the wheels of the carriages, " and small horizontal guide wheels or trucks are fitted into " blocks, which are so fixed beneath the bed of the carriage as " that the circumferences of the said horizontal guide wheels " shall apply laterally to the sides of the central range of stone " blocks at the upper parts, and on the opposite sides thereof, " in such manner as to prevent the carriage deviating sideways " from the proper track, and therefore the wheels of the carriage " will be confined to travel regularly along the iron bars." The inventor also makes use of a "toothed rack or rail of cast iron " fixed upon a raised path of stone laid along the central part of " the road," for the purpose of assisting in the ascent of inclines.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 11, p. 292; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 475.]

A.D. 1826, March 4.—N° 5342.

MIDGLEY, Robert.—"A method, machinery, or apparatus for "conveying persons and goods over or across rivers or other "waters, and over valleys or other places."

A railway is constructed beneath the water, or in the valley, upon which runs a carriage or platform, forming a travelling bridge between two fixed landing places. The carriage is propelled by ropes from the land, or by a rack and pinion.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 4 (*third series*), p. 58; London Journal (*Newton's*), vol. 14, p. 27; Register of Arts and Sciences, vol. 1 (*new series*), p. 150; Engineers' and Mechanics' Enclyclopædia, vol. 2, p. 478.]

A.D. 1828, May 1.—N° 5646.

BROWNILL, Jonathan.—"An improved method of trans-"ferring vessels from a higher to a lower level, or from a lower to "a higher level, on canals, and also for the more conveniently "raising or lowering of weights, carriages, or goods on railroads, "and for other purposes."

The invention consists in an "improved apparatus for raising "or lowering goods from one level to another on canals or rail-"ways, by means of which the weight to be raised is suspended "over a double set of pullies, and between two balance weights "instead of one, as heretofore, such balance weights being vessels "containing water, the quantity of which may be adjusted exactly "to compensate the weight to be raised in a new manner." The inventor claims the "arrangement of a caisson with a double "bottom, connected with reservoirs, or of a platform . . . . sus-"pended between two sets of pullies and two balance weights."

Also "the arrangement of reservoirs and connecting pipes for "transferring water with very little waste backwards and forwards, "as occasion may require," to work the lift on railroads, and in other situations.

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 8 (*third series*), p. 466; London Journal (*Newton's*), vol. 7 (*second series*), p. 78; Register of Arts and Sciences, vol. 3 (*new series*), p. 33.]

A.D. 1828, September 18.—N° 5704.

LOSH, William.—"Certain improvements in the formation of "iron rails for railroads, and of the chairs or pedestals in or upon "which the rails may be placed or fixed."

The patentee says he has two objects in view: "First, to give "additional strength to such parts of the rails as in former modes "of constructing them appear to suffer most from the pressure "and shocks to which they are subjected by the passage of loaded "waggons or other carriages; secondly, to join the rails to the "chairs which support them by such means as shall be less liable "to be deranged by the carriages which shall pass over them "than those modes which have hitherto been adopted." To accomplish these objects he forms his malleable iron rails "with "certain projections upon their lower edges, and which projec-"tions may be formed by welding, hammering, rolling, or other-"wise, at the joints" of his improved cast-iron rails, which he proposes to make "with half-lap ends or joints."

The patentee introduces, "by casting them in proper moulds, "studs and cavities or sockets on the sides of the half-laps, and "which will add to their strength at the same time that they will "*facilitate* and make more perfect their junction with the chairs "on which they are to rest." Lastly, he forms, "by casting them "in moulds made from proper models, chairs of such peculiar "forms as shall be adapted to receive and support the rails" of his particular construction.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 9 (*second series*), p. 123.]

A.D. 1829, May 21.—N° 5790.

DICK, MAXWELL.—"An improved railroad, and method of "propelling carriages thereon by machinery, for the purpose of "conveying passengers, letters, intelligence, packets, or other "goods with great velocity.

The invention consists "in the erection of suspension lines of "railway, ... in the erection of which suspension railways "there will require to be built or erected numerous columns, "pillars, or other supports, to be of different heights and con-"structions, as circumstances or the particular situation of the "country may require, so as to favor as much as possible a rising, "falling, or undulating surface, crossing of rivers, mooses, or "other obstacles, the whole intended to run from stage to stage "in direct lines." The inventor describes the rails of which he most approves "whereon the carriage is suspended and passes "right under the rails, they being four in number, of an oblong

" arrangement, the two upper being the bearing, and the two " under the safety rails. These rails are all kept parallel with " each other by means of braces or stays formed of iron, to which " the rails are securely fastened at every three or four feet distant " from each other. These braces or stays may be varied in " strength, pattern, or distance from each other as may be thought " necessary. The carriage is furnished with deeply grooved " wheels, which run upon the upper rails, and with flat surface " safety wheels on the under rails."

The method proposed of dragging the carriage along the railway is "by means of fixed or stationary engines acting with " drag lines or rope, which, if the line of the rail be double, " would act in an endless round; but if a single line of railway, " then the engines shall be interchangeable and reciprocal, which " method of drawing carriages by means of rope or line is already " well known."

[Printed, 1*s*. 4*d*. Drawings. See London Journal (*Newton's*), vol. 9 (*second series*), p. 168; Mechanics' Magazine, vol. 13, p. 258; Register of Arts and Sciences, vol. 4 (*new series*), p. 161; and vol. 5, p. 47; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 503.]

A.D. 1830, June 8.—N° 5941.

PALMER, George Vaughan.—" A method to cut and excavate " earth."

In this machine the excavation is performed by means of a row of "knives or cutters" attached to the ends of beams, which beams when in motion strike downwards, " cutting the whole breadth and " depth of the face of the earth they are applied to." "On each " rising of the beams the engine is made to advance forward on a " railway by means of a chain, wheel, and pinion, which advancing " motion is locked (by a pall dropping between the teeth of a spur " wheel attached to the carriage wheel) during the act of cutting." The earth is removed by boxes or receivers, assisted by a scraper, " whose motion is similar to that which is described by a man " when using a pickaxe, and in some soils it may be made to " accomplish the work without the use of the front knives."

The abridgment of the Specification of this invention is inserted in this series, because, though the patentee does not say so, it is evidently applicable to excavating for railway purposes.

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 12 (*third series*), p. 9; London Journal (*Newton's*), vol. 7 (*second series*), p. 314; Register of Arts and Sciences, vol. 5 (*new series*), p. 232; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 485.]

A.D. 1831, February 21.—N° 6079.

GRIME, JEREMIAH, the younger.—"A certain method of dis-
" solving snow and ice on the trams or railways in order that
" locomotive steam engines and carriages, and other carriages,
" may pass over railroads without any obstruction or impediment
" from such snow or ice."

The invention consists "in applying heat to tramways and rail-
" ways . . . . either through pipes underneath or alongside of
" solid rails or trams, through pipes, rails, or trams themselves
" when hollow, or both of them, in such a manner as to melt
" the snow or ice that would otherwise collect upon the same,
" and impede the progress of carriages thereon."

The line of rails is divided into stations of a convenient distance, from about two or three miles apart, and at each station is a boiler. In the boiler the water is heated and forced through a pipe into the hollow rails to the next station, and so on from station to station to any required distance; the boilers and transverse pipes are all supposed to be placed in a situation several inches below the level of the rails, which will be found a convenience in regulating the flow of the hot water. An arrangement of taps or valves by means of which the hot water is received into and driven out of the boiler, and driven into and received out of the hollow rails as occasion requires, is described. A float is connected by means of a rod and levers to the taps; the water is expelled by the elastic force of the steam in the boiler into the hollow trams or rails.

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 12 (*third series*), p. 209; London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 285. Register of Arts and Sciences, vol. 6 (*new series*), p. 200; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 548.]

A.D. 1831, October 31.—N° 6187.

MACDONALD, JAMES.—(*A communication.*)—"A certain im-
" provement or improvements in the construction of bridges
" made of iron or other materials, which improvement or improve-
" ments are also applicable to the construction of piers, railroads,
" roofs, and other useful purposes."

[No Specification enrolled.]

A.D. 1832, June 29.—N° 6281.

MACDONALD, JAMES. — (*A communication.*) — "An improved
" construction of railroads.

This invention consists "in a peculiar mode of arranging and "combining bars, rails, or ribs of metal, so that the several bars, "rails, or ribs shall respectively sustain or support the pressure "and tension of each other," and which combination is applied to the construction of roads or ways for the passage of tram waggons and other carriages.

"This peculiar arrangement of bars, rails, or ribs constitute "when combined in certain lengths," from forty to fifty feet, "a "succession of very flat curves or segments of polygons, which "will not require the lateral support of abutments, as they bear "perpendicularly upon their piers placed at proper distances. "The leading feature of this invention may be perceived by "reference to the rafter tie beam and king post of an ordinary "roof, the structure of the improved road or way being a succession and construction of rafters, tie beams, and king posts "connected by transverse bolts," by which is obtained strength and stability. Thus the construction of a railway upon columns, piers, or sleepers, at any height from the ground, is facilitated "by arranging and contriving diagonal, horizontal, and perpendicular bars, rails, and ribs of metal so as to produce nearly an "equal tension and pressure of the parts."

[Printed, 1*s*. 6*d*. Drawings. See London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 158. Rolls Chapel Reports, 7th Report, p. 139.]

A.D. 1832, September 8.—N° 6306.

BADNALL, RICHARD, the younger.—"A certain improvement "in the construction or formation of the trams or rails or lines "of rail or tram roads, upon which locomotive engines shall or "may work or be employed."

The patentee says, "I claim as my invention the forming of "trams or rails, or lines of rail or tram roads, in such undulating curve or curves as will enable me, in ascending hills, to "combine and apply the advantages of momentum from gravity "acquired in running down the descending curves of hills with "the propelling power of locomotive engines to be employed "thereon, not confining myself to any particular extent of line "or form of curve, but varying and adapting the curve or curves "according to the surface of the country, or other local circumstances."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 15 (*third series*), p. 202. London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 177. Engineers' and Mechanics' Encyclopædia, vol. 2, p. 551.]

A.D. 1832, September 29.—N° 6317

CONVERSE, SHERMAN.—(*A communication.*)—" Certain im-" provements in making or manufacturing metallic rails for the " construction of railroads."

The improvements consist " in the application of a rod, bar, or " bolt of wrought iron longitudinally under the common wrought " iron rail . . . . of such length as to be attached to or firmly " connected with two successive chairs, so that the said rod may " firmly secure the two chairs with which it is connected from " separating in the direction of the tension of the said rod;" also "in the form of the chair, which is to be adapted to the " use of the tension rod and braces."

Thirdly, " in the introduction of braces when the distances " between the chairs shall be so great as to require additional " support to the crown of the rail, said braces to consist of " wrought-iron bars or bolts, of suitable length and dimensions, " and so applied that one end of each shall set into or rest firmly " against the insides of the two chairs, and just above where the " tension rod is connected with the chair, while the other end of " each is elevated to the foot or under side of the rail, so as " nearly to meet in the middle between the two chairs, and is " there secured by being let into a solid piece of cast iron with " grooves or indentations to receive the ends of the braces, and " which is attached to the foot or under side of the rail;" and also "in connecting or tying the two lines of rail in the road by " means of rods passing from rail to rail across the road, or " from chair to chair across, and attaching them to the rails or " chairs in any suitable manner so as to operate both as a tie " and a brace."

[Printed, 4*d.* No Drawings. See Repertory of Arts, vol. 15 (*third series*), p. 210; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 198; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 552.]

A.D. 1832, November 6.—N° 6328.

SCRIVENOR, HARRY.—" A certain improvement or improve-" ments in the construction of iron railways."

The invention consists " in constructing those parts of railways " usually called chairs or pedestals of wrought iron instead of cast " iron heretofore used for that purpose, and either in one single " piece or more pieces as may be thought best, for the particular " railroad on which they are intended to be used." The patentee claims "the substitution of wrought or malleable iron in place of "cast iron in the construction of those parts of iron railways "called chairs or pedestals, whether the same be made in one "single piece, or of separate pieces rivetted or otherwise fastened "together."

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 15 (*third series*), p. 65; London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 166; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 553.]

A.D. 1833, June 1.—N° 6433.

JESSOP, William.—"Certain improvements in constructing "railways."

The invention relates "to the manner of constructing the chairs "in which the rails are fixed, that is, in place of the usual mode "of fixing and supporting the chair upon a stone block, wood, "or other sleeper, the chair is made distinct from the pedestal, "which is attached to the stone block, wood, or other sleeper, "and the chair and pedestal are connected by an universal joint "or hinge, which permits the pedestal to adapt itself to any "irregular sinking of the block or other support upon which it "rests, and insures a firm or solid bearing on its base; or this "may be effected by the combined motion of a hinge joint or "other means permitting motion between the pedestal and "chair, and a moveable joint formed at the junction of the chair "and rail, so as to produce the same effect, and thereby answer "the purpose of an universal joint."

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 16 (*third series*), p. 199; London Journal (*Newton's*), vol. 4 (*conjoined series*), p. 183; Mechanics' Magazine, vol. 19, p. 282; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 554.]

A.D. 1833, June 20.—N° 6438.

GIBBS, Joseph, and APPLEGATH, Augustus.—"Certain "improvements in the construction of railroads, bridges, piers, "jetties, and acqueducts, part of which may be applied to other "useful purposes."

This invention comprises a railway composed of wrought-iron rods supported upon columns fixed to foundation plates made of cast iron, and connected together by bolts and nuts, and secured to the earth or soil by means of vertical rods, furnished with moveable arms or flukes, which when open prevent the return of the bolts; the wrought-iron rail rods are intended to be laid down in as long lengths as possible. The ends of the rods are formed into dovetail hooks, which fit into a connecting link. A wedge pin is driven in between the two ends, and into the top of the column; it is then secured by a transverse key or collar. When no columns are used, simple bearing chains must be introduced at convenient distances; these chairs may be connected with the earth in the manner before described, if necessary. In the under or supporting rail, which may be made of cast iron, the upper surface is slightly concave, to receive the wrought-iron rail rod, and should be as long as possible, to combine several supporting rails by one joint. The ends of the rail are made wedge-shape and the chair also. The ends are forced up against the sides of the chair, and firmly held there by means of wedges; the chairs may be fastened to sleepers or blocks, or they may be connected with the earth. "The wheels to be used with these " rail rods may either be made with flat holes and flanges, in the " usual manner, or their rims may be concave, taking care that " their concavity is part of a larger circle than the railroads."

[Printed, 2*s*. 2*d*. Drawings. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 399.]

A.D. 1833, August 10.—N° 6457.

SMITH, Robert, and WALKINSHAW, John.—"An im" proved rail for railways."

The invention consists "in making or forming wrought or " malleable iron rails for railways with feet or pedestals, formed in " one piece with the rail itself, and projecting at intervals from the " sides and base or bottom parts thereof, and which projecting " pedestals, or feet are intended to support the rails in their " proper positions upon sleepers or blocks of stone or wood, and " are intended to be used in place of ordinary chairs or pedestals " of the common rail."

[Printed, 1*s*. Drawing. See London Journal (*Newton's*), vol. 4 (*conjoined series*), p. 115; Rolls Chapel Reports, 7th Report, p. 146.]

A.D. 1833, December 11.—N 6524.

STEPHENSON, Robert, the younger.—"An improvement in " the mode of supporting the iron rails for edge railways."

The invention consists in supporting the iron rails upon a " segmental bearing piece," which is lodged in a suitable cell at the bottom of the notch in each chair, “the rail being confined “ downwards on such bearing piece by the same force of keying “ action, which also confines the rail laterally in the chair, and “ the action or pressure which produces such confinement being “ applied at or very near to the centre of curvature of the “ said segmental bearing piece, and of the cell wherein the same “ is lodged, in order that the supporting and confinement of the “ rails may not be disturbed or relaxed by a slight tilting or inclination of the chair in the direction of the length of the rails,” and in the mode “ of producing the requisite confinement of the “ rails in the chairs by means of wedge-like cross keys and “ cylindrical pins, applied in suitable sockets through the cheeks “ or sides of the chairs, and by forcing the pointed extremities of “ those pins into oblong grooved recesses in the rails, so as to “ exert an oblique bearing-down action on the rails by the same “ force of keying which produces the lateral confinement of the “ rails.”

[Printed, 1*s.* 4*d.* Drawings. See Repertory of Arts, vol. 2 (*new series*), p. 270; London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 80; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 560; Rolls Chapel Reports, 7th Report, p. 148.]

A.D. 1834, March 1.—N° 6570.

PINKUS, Henry.—“An improved method of or apparatus for “ communicating and transmitting or extending motive power, by “ means whereof carriages or waggons may be propelled on railways or common roads, and vessels may be propelled on “ canals.”

The invention consists “in the application of a well-known “ principle in pneumatics to and in combination with a new apparatus, or new and improved combination of apparatus and “ machinery, whereby motive power can be generated, and great “ velocity may be acquired.”

The principle when applied results in “ the action obtained by “ means of a partial vacuum, by rarefying or partially exhausting the atmosphere contained in an extended tunnel, tube, “ pipe, or conduit having a transmitting and accelerating piston “ impelled by the ordinary weight or pressure and elasticity of “ the atmosphere.”

The action is effected “by the operation of air pumps worked “ at stations along and near to the line of road by fixed steam “ engines or stationary engines of any other kind which may be

“ made advantageously available as first movers.” The method of “communicating motive power to cars, carriages, or other “ moveable bodies consists in transferring the action generated or “ produced . . . . in the interior of a tunnel, tube, conduit, or “ pipe to its exterior by connecting a vehicle or machine situated “ within and to be impelled along the interior, or on the inner “ side of the said tunnel, tube, pipe, or conduit by the piston “ aforesaid, which vehicle or machine is denominated the dynamic “ traveller, with a car situated exteriorly or on the outer side of “ the said tunnel, tube, pipe, or conduit, which car is denominated “ the governor.”

The inventor also describes the arrangements of the valves and other details.

[Printed, 1*s.* 8*d.* Drawings. See London Journal (*Newton's*), vol. 6 (*conjoined series*), pp. 158 and 256; Mechanics' Magazine, vol. 23, pp. 65, 121, 150, 164, and 237; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 36; Artizan, vol. 4, p. 1; Jurist, vol. 12, p. 233; Rolls Chapel, 7th Report, p. 150. Extension applied for, but not granted.]

A.D. 1835, January 22.—N° 6750.

“The enrolled copy of the Specification and drawings of this “ Patent (dated 22nd January 1835) having been stolen from the “ Petty Bag Office, the following Specification and drawing of a “ Patent obtained in Scotland for an invention bearing the same “ title, dated 10th April 1835, have been supplied in place thereof “ from the records of the Office of Chancery in Edinburgh.”

DAY, JOHN.—“ An improvement or improvements in the construction of railways.”

These improvements consist “ in constructing the iron rails for “ edge railways with a sufficient breadth of horizontal surface at “ the under side of the rail, to be supported upon the earth or “ ballasting throughout the whole length of the rail, the earth “ or ballasting being made sufficiently solid beneath the rail to “ bear the same, wherefore the iron rails,” according to the improvements “ will be equally supported by the earth or ballasting “ beneath every part of the length thereof, instead of being “ supported at intervals, leaving hollow unsupported parts of the “ rails between their several points of support, as in the manner “ commonly practised.”

[Printed, 1*s.* 4*d.* Drawings. See Mechanics' Magazine, vol. 66, p. 558; Petty Bag. Specification stolen. Abstract from English Patent and copy of Scotch Specification, printed.]

A.D. 1835, February 16.—N° 6766.

PRICE, JOSEPH.—" Certain improvements in railways, and in " the means of transporting carriages from one level to another."

[No Specification enrolled.]

A.D. 1835, May 5.—N° 6827.

REYNOLDS, JOHN.—" Certain improvements in railways."

In " giving to the rails, bars, or plates on which the wheels of " carriages run, or are intended to run, a similar and equal " support in every part of their length, so that they shall not be " susceptible of depression or deflection by an incumbent weight " at one part more than another part." This is done " by cast-" iron bearers laid and joined end to end in and upon the ground " or roadway, and which are of such width and strength as to be " incapable of being in any part depressed into the ground or " roadway to any injurious degree by carriages passing up or " along them, they being so connected or fastened to each other " as that no one of them shall be capable of any vertical or lateral " movement independent of those next adjoining it. The rails, " bars, or plates over which the carriage wheels are intended to " run may be either cast on, and with the bearers form part of " them, or they may be separate pieces of wrought or cast iron " fixed end to end upon or into the bearers, so as to rest thereon " throughout their whole length or at short intervals of their " length." Also " by bearers formed of blocks of natural or " artificial stone, joined end to end, and laid or bedded upon and " in the ground or roadway."

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 5 (*new series*), p. 285; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 574.]

A.D. 1835, August 17.—N° 6885.

PINKUS, HENRY.—" Improvements in inland transit, which " improvements are applicable to and may be combined with an " improved method of, or combination of method and apparatus " for communicating and transmitting or extending motive " power, by means whereof carriages or waggons may be pro-" pelled on railways or roads, and vessels may be propelled on " canals."

This invention refers to that by the present patentee, dated 1 March 1834.

It consists "in a method or in methods of constructing the " pneumatic valve and the valvular cord, and in the manner of " using the same, one of which methods" the patentee designs " to substitute for and in lieu of the valve and cord described in " the Specification of his former Patent, that is to say, when " applied to the railway tunnel therein described, the other " methods being more particularly applicable to a mode of " generating power by rarefaction in an extended pneumatic " tunnel, pipe, or main, and communicating each power to a " pneumatic engine situate on the outside of and transferring " the said power along such tunnel or main, and thereby impelling " or propelling cars, carriages, or vessels along and near to the " line of said extended main; in an improved method of con- " structing the travelling diaphragm or piston which is attached " to the dynamic traveller, and improvements in the latter, " whereby communication may be established between the vacuum " part of the tunnel and a pneumatic engine situated in the " governor; in the combination and application of a well-known " means of transferring power induced by a fixed first mover " to pneumatic machinery placed at certain distances along a line " of railway; in a combination, being a means of working a line " of railway," which is denominated "a reciprocating method; in " a further means of opening and shutting the station valves; in " procuring and bringing into available action the adhesive " power of some, or any, or all of the wheels of a train of cars or " carriages on a railway, and thereby to facilitate the impelling of " a train on an ascending plane; in the application of an improved " and self-acting brake, whereby the speed of a train in motion " may be retarded; in an improved method of constructing the " railway, and fixing and supporting the rails; the whole of " which several parts when combined in all or in part form what" is denominated "a pneumatic railway."

[Printed, 2*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 23, p. 65.]

A.D. 1835, December 3.—N° 6940.

PARKIN, THOMAS.—"Certain improvements in sleepers or " bearers applicable to railroads."

The invention consists "in constructing or moulding sleepers " or bearers applicable to railroads of clays and other materials,

" and by burning the same produce hard blocks, to be used as " substitutes for the ordinary stone sleepers or bearers now in " use."

Also in the construction of "continuous wooden sleepers or " bearers . . . received in grooves in other sleepers;" and in " making grooves in continuous wooden sleepers or bearers for " receiving the rail or bar of iron, whether such continuous " longitudinal sleepers of wood are affixed in grooves or other " sleepers or not."

Also "in preparing the surface of the earth for continuous " sleepers, whether of stone or other materials;" and also in " constructing hollow sleepers or bearers, and filling them with " concrete or cement."

[Printed, 8*d*. Drawing. See Mechanics' Magazine, vol. 24, p. 234; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 575.]

A.D. 1835, December 3.—N° 6942.

WITTY, RICHARD.—" An improved method or methods of " arranging and combining certain materials used in constructing " houses, bridges, and other buildings, whereby greater strength " and durability will be obtained."

The inventor claims a method of " combining a number of plates " of wood and iron, or of wood alone, or iron alone, into one " lamellar beam of greater strength than any solid beam containing " ing the same quantity of material;" and also a method of " girding, trussing, or supporting such lamellar beams or joists, " or rafters or spars, by means of segmental arcs or hoops."

A drawing represents an application of this invention to railways. The rails are supported by the beams, which are strengthened where necessary, such as at crossings over ravines, &c., by segmental ties.

[Printed, 6*d*. Drawing. See Mechanics' Magazine, vol. 26, p. 33.]

A.D. 1836, February 3.—N° 6995.

HARVEY, FREDERICK EDWARD, and BROWN, JEREMIAH.— " Certain improvements in the process and machinery for manu- " facturing metallic tubes, and also in the process or machinery " for forging or rolling metal for other purposes."

Skelps are first made by rolling out the iron while hot. The edges of these skelps at their ends are then turned over partially, by means of rolls "having excentric and peculiarly formed grooves, "and afterwards" the bending of the whole skelp is completed by passing it between rolls with a stationary mandrel between them. Lastly, the skelp is heated to a welding heat in an air furnace, and the edges are closed on a stationary mandrel by a pair of grooved rolls.

Among various kinds of tubes to be made by the inventors is "a triangular tube, which may be used for the rail of a tram-"road."

They further describe a method by which a bridge-rail may be made, by first acting on the iron by rolls, and then by mandrels and rolls the sides are brought sufficiently near to each other to complete the rail.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 11 (*conjoined series*), p. 144; Rolls Chapel Reports, 7th Report, p. 170.]

A.D. 1836, April 23.—N° 7069.

KOLLMAN, George Augustus.—"Improvements in railways "and in locomotive carriages." The improvement consists in "the application of a T-rail in between the rails on which the "carriages run; the object of this rail is to guide the carriages "and at the same time to prevent the carriages being thrown off "the rail. . . . . The main rail or governing track also is so "constructed as to prevent the carriages running or being "thrown off the track." The patentee does not confine himself "to any particular mode of affixing such rail or governing "track," though he prefers that it "should be a double T-rail, "that is, having a part for preventing the carriage being thrown "off the railway," and "controlling the direction of movement "of the carriage;" also by the application of a "frame to control "the wheels of locomotive carriages running on railways, in order "to cause the wheels of such carriages to keep the required track, "the axles of such wheels being capable of movement on axes, "such frame being caused to move correctly to the rails on which "the locomotive carriages are running" by guide wheels on the central rail.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 7 (*new series*), p. 188; London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 368.]

A.D. 1836, May 18.—N° 7100.

DE BAC, Pierre Barthelemy Guinibert.—"Improvements "in railways."

[No Specification enrolled.]

A.D. 1836, August 6.—N° 7163.

BINNS, THOMAS.—" Improvements in railways, and in steam " engines used thereon, and for other purposes."

The invention relates to "the mode of constructing the rails " and supports thereof for the passage of carriages."

To the " application of screws to propelling carriages up inclined " planes, and for regulating the descent of carriages down inclined " planes ; " and also " to the construction of rotatory steam " engines, particularly applicable to the propelling of carriages on " railways, also for other purposes."

"The rails are cast together with inverted supports, which " consist of hollow trunks or castings of iron, which, being filled " with concrete or other suitable material, offers a secure support, " and will be more capable of ensuring a level and uniform surface " of rail than any other means at present in use for the same " purpose."

"The inverted supports are combined together, and retained " parallel by means of iron ties, one to each joint of rails and " supports, and these ties are affixed to the supports by means of " screws or other suitable means."

The inventor also purposes to lay down a screw shaft between the rails to assist the propulsion of vehicles. In applying screws on inclined planes of railways, " the locomotive carriage coming " up with a train is to be hooked or connected with the truck " or carriage, and the shaft put into gear with the working " power ; and it should be remarked that suitable clutch boxes " should be employed for this purpose, by which the working " of the screws may be put into and out of motion whenever " required."

" When the truck or carriage has arrived partly up the inclined " plane, so much as to have drawn up the whole train on the " inclined plane, a second truck or carriage should be run on, in " order to push the train up the inclined plane, in order that the " first truck or carriage may, when it comes to the top of the " incline, and consequently no longer acted on by screws, may " with the train of carriages be forced forward, and arrive in a " proper position for the locomotive carriage again to draw its " train ; the trucks or carriages are then to be detached."

[Printed, 2*s*. 6*d*. Drawing. See Repertory of Arts, vol. 8 (*new series*), p. 65.]

A.D. 1836, October 4.—N° 7199.

WHITE, James.—" Certain improvements in railways."

The invention consists in " an improvement of the chairs for " supporting and retaining the rails ; " also " in an improvement " in the construction of slate blocks and the mode of retaining " them in a parallel position by cross ties of iron in order to keep " the rails correct ; " and, lastly, " in an improvement to prevent " the ends of the rails parting where they meet beyond the space " allowed for the contraction of the rails."

With regard to the first part of his improvements the inventor claims " the constructing the chairs of railways with moveable " cheeks, which are capable of being affixed independently of " the rail, which is supported and retained in such a manner " as to afford great facility in placing or removing it, and also in " removing a block or chair whenever it may be required."

He prepares his slate blocks with a level seat for the chair," by " passing it over a rotatory cutter or toothed roller, capable of " making a regular and even surface." He prepares the holes and countersinks them by means of machine drills acting simultaneously, and provided with countersinking cutters on their spindles.

The ends of the rails are secured together " in the joint chair " by a link " fastened to the rail ends by two studs.

A machine is described for sawing and drilling slate blocks for railways.

[Printed, 1s. 10d. Drawings. See Mechanics' Magazine, vol. 45, p. 180; Engineers' and Architects' Journal, vol. 1, p. 162.]

A.D. 1836, October 13.—N° 7209.

RUTHVEN, John.—" Improvements in the formation of rails or " rods for making railways, and in the method of fixing or joining " them."

" The rails consist of two hollow tubes cast into a rail, having a " suitable surface at the upper part for the wheels of railway " carriages. The particular feature of novelty consists of the " formation of the lower part by so placing the core in the process " of casting that the inner circle or bore shall be eccentric to the " outer edge, the metal at the lower surface being considerably " thicker than the other parts, and gradually decreasing till the " upper portion of the circle or circumference, where the shape or " form for the edge rail is to be constructed, or is to be raised on

" a second tube. It will be evident that by arranging the " thickness of metal so as gradually to increase from the lower " to the upper surface very considerable strength may be obtained " with lightness of metal." The rails are " supported in their " chairs which are formed to receive the rails, and are merely " capable of sliding on to the rails sufficient to receive the ends " of two rails within them, that the rails may butt against each " other and form a joint, the chairs being only used where the " joints or parts of the railway bars come together."

" The second part also consists in constructing hollow wrought-" iron rails with suitable surfaces for the carriage wheels to run " on " from plates by means of grooved rolls.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 7 (*new series*), p. 319.]

A.D. 1836, November 8.—N° 7217.

SMITH, JAMES ELNATHAN.—(*A communication.*)—" Certain " improvements in railways, and on locomotive carriages to work " on such railways."

[No Specification enrolled.]

A.D. 1836, December 3.—N° 7244.

BOOTH, HENRY.—" Certain improvements in the construction " and arrangement of railway tunnels, to be worked by locomotive " engines."

The invention consists " in the formation of duplicate tunnels " near and parallel to each other, but with different and opposite " gradients, there being in each tunnel one line of railway " instead of forming, as is usually done, one large tunnel with " two lines of railway, both lines having the same inclinations or " gradients; and the difference of gradients which is recom-" mended for general practice is after the rate of twelve to four-" teen feet per mile." " Supposing the tunnelling to be effected " be one mile in length, and which, on the ordinary construction " hitherto adopted would consist of one tunnel with two lines " or way through it, and that on the ordinary plan the same " would be formed on the level," the patentee recommends " the " construction of two tunnels having each one line of railway " descending twelve or fourteen feet in the direction of the moving " traffic, which arrangement may be accomplished by raising one " end of each duplicate tunnel and depressing the other six or " seven feet from the level line, each tunnel declining twelve or

" fourteen feet in the direction of the moving traffic through the " said tunnel."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 8 (*new series*), p. 243; Engineers' and Architects' Journal, vol. 1, p. 27.]

A.D. 1836, December 9.—N° 7252.

YATES, John.—" Certain improvements in the tram roads or " railways, and in the wheels or other parts of carriages to be " worked thereon."

This invention consists " in applying to railroads already con" structed, or to those which may be constructed in future, a tram " or trams, wheelway or wheelways, inside or outside of each " single line of edge rail, more especially when there is an incli" nation on the railway, such tram being made either of wood, " iron, stone, concrete, or other suitable material or surface, in " such manner that when the engine arrives at the part so con" structed, the wheels instead of working only on the edge rail, " shall bear upon the tram, and thus obtain for themselves a " greater adhesion or attachment by means of the larger bearing " surface."

Claims, "the combination of the edge rail and other surfaces " whereon an improved wheel may work."

[Printed, 10*d*. Drawing. See Rolls Chapel Reports, 7th Report, p. 178.]

A.D. 1837, May 13.—N° 7373.

DE BAC, Pierre Barthelemy Guinibert.—" Improvements " applicable to railroads." According to this invention, the rails are supported on rows of stone blocks placed diagonally, corner to corner, with additional blocks at intervals between the rows. The patentee recommends, " when the ground is soft and doubt" ful, that in order to prevent the blocks being forced into the " earth by the pressure of the loads passing over the rails," that the spaces between them should be filled in " with woodwork, by " which a more extended surface of bearing will be obtained, and " form, in fact, a complete bearing surface, by which the blocks " will be assisted in bearing the loads carried over them, and they " will consequently be less liable to be deranged. The blocks are " connected together at their angles by means " of what are called " vertical ties," and which are formed of cast iron, " and they are " so formed that the stones rest on and are supported by the ties, " and the upper surface of the stone comes under a portion of the " vertical ties, hence each tie may be said to form a key to the

" angles of two stone blocks; and when further combined by " means of transverse ties of iron, the whole length of railroad " will be supported by a continuous frame, the parts of which " mutually assist each other; and any pressure or shock to one " part is communicated to the surrounding parts, and borne " mutually by them."

The rails rest on a continuous bearing surface or chair " formed " of two different pieces so as to offer a hollow part, in which a " semi-fluid enveloped in felt is placed " to neutralise concussion.

Another arrangement of blocks is described in which alternate blocks are placed vertically on one angle, the chair or bearing surface being secured to the upper angle, the whole system being also braced together by cast iron framing.

[Printed, 1*s.* 10*d.* Drawings. See Repertory of Arts, vol. 9 (*new series*), p. 327.]

A.D. 1837, May 25.—N° 7380.

FREEMAN, CHARLES JOSEPH.—" An improvement or improve- " ments in machinery or apparatus called rolls for rolling iron or " other metals, applicable to rails for roads and bars of various " shapes for other purposes."

The object of this invention is " the construction of rolls in " such manner that the parts or working surfaces thereof may " with facility be so relatively set up to each other as they become " worn that they may be continually brought up to produce " bars or surfaces in continued succession more equal the one to " the other, and more correctly to guage than when produced by " means of rolls of the ordinary structure."

This is effected by wedging up movable collars on the rolls.

[Printed, 1*s.* Drawings. See Repertory of Arts, vol. 9 (*new series*), p. 90.]

A.D. 1837, November 25.—N° 7487.

VAILE, HENRY PURSER.—" Improvements in rails for rail- " roads."

The inventor says " the object of the invention is to produce a " more quick repetition of the sidings of sideway lounges of the " carriages, thereby shortening them and reducing their force or " momentum by so constructing of the surfaces of the rails as to " enable me to reverse the diameters at any desired rate, causing " the acting and re-acting upon the weight to take place so quickly " that it has not time to move in opposite directions, and thus

" give the carriage a greater tendency to move in a more central " position in respect to the rails than heretofore, without bringing " the flanches of the wheels so nearly in contact with the sides of " the rails, and thus to avoid the friction and strain consequent " thereon to the engine; and my invention consists in giving to " the rails such a shape or figure on the upper surfaces that in " place of the bearing surfaces for the wheels on each rail being " one continued and straight line constantly parallel to the sides " of the rail, itself, as heretofore, I make the surface to pass and " return in an angular direction across the face or upper sur- " face of the rail, by which means the diameter of the point of " bearing of the wheel will be constantly varying by the figure of " the rail, hence those long sidings or sideway loungings of the " carriages . . . . will be interrupted by the figure of the rails " working or bearing surface, and the carriage will have a " greater tendency to retain and pursue a more central direction " or course in respect to the two rails which constitute the " railroad."

[Printed, 6*d*. Drawing.]

A.D. 1838, January 4.—N° 7528.

WORSDELL, Nathaniel.—" Improvements in apparatus to " facilitate the conveyance of mail bags and other parcels on " railways or roads."

The invention consists " in applying mechanical means to rail- " ways or railroads and the carriages which run thereon, whereby " mail bags may be taken and left at any determined places or " stations with the greatest facility without stopping or retarding " the motion or speed of the train of carriages; it is meant " also to apply to bags containing parcels, for it is better to put " small parcels in bags."

The bag to be dropped is suspended on an arm on the carriage and released by coming in contact with a similar arm at the station. The operation is reversed in taking up bags.

[Printed, 1*s*. Drawing. See Repertory of Arts, vol. 10 (*new series*), p. 257.]

A.D. 1838, February 8.—N° 7563.

DEVILLE, Jerome.—" Certain improvements in railroads and " in the carriages to be used thereon."

[No Specification enrolled.]

A.D. 1838, March 10.—Nº 7590.

EVANS, Thomas.—"An improved rail for railway purposes, "together with the mode of manufacturing and fastening down "the same."

The invention consists "in a rail with a dovetail or other catch "grove in its under side, whereby it may be held firmly down;" also "in rolling the said rails in a series of peculiarly-shaped "grooves in rollers" to form the said dovetail or catch groove; "and "in certain plugs for fastening down the said rails, which "fit into and may be slid along the said groove and keyed down "to chairs placed at any distance from each other along the line "of the rail."

[Printed, 1*s*. Drawing.]

A.D. 1838, March 19.—Nº 7595.

RAMEL Louis Joseph Amant.—"Improvements in machinery "for excavating and embanking earth for the construction of "railways and other works."

This invention comprises a method of loading earth into wagons, &c. by means of a lever actuated at one end by a windlass and carrying at the other a receptacle for the earth with a moveable bottom. "This lever is moveable, and may be brought very easily "from the hand to the mouth of the advancement of the trenching through the medium of wooden rollers that act on a platform, designed to facilitate their action, and to make up the "deficiences for the unevenness of the ground." "The lever "rises vertically and may afterwards be carried back to the right "or left."

It also comprises a crane, rolling on a carriage of six wheels, which crane "is designed to make up the deficiency of the lever, "whenever it should be required to bring up earth from a depth "of more than ten metres," which the lever box could not reach.

Finally, the inventor describes a shoot to be used in similar works, by means of which a man may load the earth directly into a wagon below him.

[Printed, 10*d*. Drawing.]

A.D. 1848, June 2.—Nº 7666.

HARDY, James.—"Certain improvements in rolling, making, "or manufacturing shafts, rails, tire iron, and various other heavy "articles of metal, and in the machinery or apparatus used in the "same."

The invention consists in adapting the principles set forth in the Specification of a former Patent, granted April 4, 1835, "for "manufacturing axle-trees for carriages and other cylindrical or "conical shafts, and applying the same principles to the manu-"facturing of certain articles, as square or polygonal shafts for "machinery rails for trams or railways, and the tire irons for "wheels, and various other articles, by a certain process of rolling "bars of iron to certain figures, and after faggotting such rolled "bars together bringing them into the required form by rolling, "or by swages attached to a tilt hammer or metal helve." The "patentee introduces "as portions of the said mass of metal, "longitudinal bars of steel in such situations as may be required "for particular purposes, and roll or weld these steel bars into "combination with the iron."

Also, instead of continuing to pass the masses of metal between rolls always revolving in one direction, the rolls may be reversed after every operation.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 187; Practical Mechanics' Journal, vol. 2, p. 201.]

A.D. 1838, June 18.—N° 7692.

WHITE, JOHN.—"Certain improvements in the construction of "railroads, bridges, and viaducts."

The invention as applied to railways is comprised in what is called "a resistance pile." Is it provided with a block or chair, with wedges "for giving tenseness to the bars which form the rails "fixed upon it." A block of iron is sunk into the top of the pile, and there spiked down. Through this block are cut horizontal mortices to receive the lateral wedges or keys, while corresponding mortices are cut in the rails, to allow the wedges to pass through.

"These resistance piles may be at any convenient distance from "each other, say about one sixteenth of a mile, and between them "at intervals of about fifteen feet, common piles should be driven "to receive similar blocks of a smaller size, and fastened down by "spikes passing through holes sufficiently larger than the spike "to admit of the play consequent on expansion and con-"traction."

The ends of the rails are slid into the groove cast to receive them in the block, "till the mortices in the block and those in the "rails sufficiently corespond to admit of the introduction of the "small ends of the wedges, but leaving a sufficient space between "the two ends of the rails to admit of their being extended by

" tension or of their expanding with increase of temperature. " The rails being so placed, the wedges or keys are inserted and " driven up; and if the resistance piles are sufficiently braced and " strutted not to yield by the driving of the wedge, any required " tension may be given to the rails."

The inventor claims "the application of tension in manner " aforesaid to all such metal rails and bars, and also to all such " timber beams, supports, or beams used in the construction of " railways, bridges, and viaducts as are capable from their nature " and situation of having such tension as aforesaid applied " thereto."

[Printed, 10*d*. Drawing. See Engineers' and Architects' Journal, vol. 1, p. 374.]

A.D. 1838, July 11.—Nº 7730.

VAN WART, Henry, and GODDARD, Samuel Aspinwall. —(*A communication.*)—" Certain improvements in machinery or " apparatus applicable to locomotion on railroads and to steam " navigation, parts of which improvements are also applicable to " land or stationary engines."

The invention consists "in a novel or improved day or night " signal to be used on railways or locomotive engines, for the " purpose of indicating to the conducting engineer the position " of the shunts or shifting parts of the rails, or the direction in " which the engines are travelling, or whether moving or stationary, which improvement is also applicable to fence gates or " turn plates, or other movable obstructions on railroads." It consists of a four sided lantern worked in connection with the points or otherwise.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1838, August 10.—Nº 7766.

DE BEURET, Eugene (commonly called Viscount De Beuret). —(*A communication.*)—" Certain improvements in the construction " of railways and tramroads to facilitate the ascent and descent " of hills and inclined planes."

The invention consists in providing for the locomotive engine separate rails " of a substance of such a nature and so disposed as " to cause the working wheels of the engine to have a firmer grasp " they can have upon the iron surface on which the train runs."

The peculiar rails proposed for the engines, "and which may " be used either on inclined planes only or throughout the whole " line of road, as circumstances require, vary according to the

" weight of the train, its velocity, the local materials for construction, and the expence to be incurred."

"They may be made of granite, stone, bituminous cement, or " of a layer of hard materials such as are usually employed in " making roads, or of blocks of wood well pitched, placed either " lengthwise or in an upright position, and faced with small " pebbles or metallic plates less hard than iron, and the materials " last spoken of may be introduced in the groove of rails made " for the purpose, either of cast iron or other suitable substance;" and they need not be above a few inches broad, and "may be " laid down outside of the two iron rails " that the carriages run upon.

To moderate the speed in descending inclines, the patentee places between the rails "two small shafts in wood or metal, " forming with each other an angle opening towards the summit " of the acclivity. The upper extremities of these shafts will " face the train in its descent, each turning upon an iron pivot, " whilst the lower extremities will bear upon two springs solidly " fixed."

Instead of using the break in coming down inclines "in order " that the velocity may be gradually overcome and that the " action, at first easy, may go on increasing, it will be advisable " to give a slight curve to the internal surface of the two shafts, " so that the friction may first take place between two surfaces " nearly parallel. The rubber placed under the carriages, in " penetrating in the opening formed by the upper parts of the " shafts, will cause them to rotate on their axis, and in separating " their lower extremities will press on springs with the arm of a " lever, hence the suppression of all excess of velocity."

"The carriage having passed, the springs will cause the shafts " to resume their former position, so as to afford a like resistance " to the succeeding vehicles."

These springs may be fixed under the carriage instead of between the rails if preferred, a check rail being placed on the road.

[Printed, 1s. Drawings. See Repertory of Arts, vol. 12 (*new series*), p. 198.]

A.D. 1838, August 15.—N° 7773.

FOX, CHARLES.—" An improved arrangement of rails for the " purpose of causing a railroad engine, carriage, or train to pass " from one line of rails to another."

The invention consists "in such an arrangement of rails, where " it is required to have crossings or turnouts on to sidings, as " will prevent the wheels of the carriages, engines, or machines, " or trains used thereon, from getting off the lines they are " intended to run upon, and whereby the whole of the main line " may always remain a fixed line."

The patentee says the arrangement is equally "applicable to all " cases where it is required to make provision for engines, carriages, or trains to pass from one line of rails to another, whether " on to sidings or otherwise, and claims the arrangement of rails, " particularly the guide rail and embedded turn-out rail, whereby " the fixed point 'is protected,' and the point of the turn-out " bar, as well as the shoulder of the recess" cut in the main line and made to receive the same to prevent accidents.

[Printed, 8*d*. Drawing.]

A.D. 1838, August 31.—Nº 7792.

CURTIS, William Joseph. — "Certain improved machinery " and apparatus for facilitating travelling and transport on railways, parts of which are also applicable to other purposes."

The patentee has made fourteen different claims, the three first only relate to switches, "which may be formed in various ways, " whether by bolting two of the ordinary railway bars together at " suitable distances from each other and curving one or more of " the bars to suit the radius of the fixed line with which it agrees, " or by the following method," which is considered superior to any other, "viz., rivetting the bars, whether two or more, to a " flat plate."

The size of plate is "half inch thick, ten or twelve inches wide, " and fifteen feet long; the bars having a section to correspond " with the rails are rivetted to this plate, one being bent to correspond with the curve or cross line, and the other straight to " correspond with the main line (if straight); or, should both " lines be curved, then both bars are curved to correspond with " their respective lines."

The bed planks are formed of oak three inches thick, and "at " regular distances stud plates are let into the oak bed planks, " rising about one-eighth of an inch above the surface, so that " the iron plates ride upon the iron surface of the stud plates " with less friction than if they were level with the timber."

"Towards each extremity of the stud plates studs are raised, " which confine the switches within their limits of motion and

" form supports against which they rest, and thus acquire a " certain degree of solidity whilst the trains pass over them.

"The oak planks are then let into the longitudinal timbers of " the railway, if formed upon that plan, or bolted to timber " of sufficient solidity, and united in the usual way with the rails, " if the system of stone blocks and iron chairs be employed." There is a "centre plate for the centre stud to work in, a hole is " bored in it to suit the pin, and it is then bolted to the bed " planks, and thus the switches are secured at that end. Two " radius bars connect the switches in the usual manner; the " longer rod passes to a lever by which the movement of the " switch is effected" and acts in the manner of a treadle.

There is also provided a safety guard rail "with the view of " preventing an engine or train running off the rails by the " switches being placed wrong." A balance weight keeps the switch straight for the line, "but whilst right for the line it is " wrong for the cross line; in this case, if an engine were to pass " along the switch of the cross line, the wheel would impinge " against the guard rail, push the switch over, and make it right " for that line, and when it has passed over the switch will shut " again by the reaction of the counterbalance, and keep it right " for the main line."

A modification of this switch is also described, the principal difference between the two being that in the latter case "the switch " has a movement transversely to the line, and not moving from " a centre as before."

Another modification and gearing for working it are described.

[Printed, 3*s.* 8*d.* Drawings. See Mechanics' Magazine, vol. 31, p. 97; also vol. 32, pp. 369, 372, 409, 468, and 525; Engineers' and Architects' Journal, vol. 2, pp. 122, 239, 435, and 447; vol. 3, p. 5; vol. 6, p. 19.]

A.D. 1838, September 13.—N° 7809.

WILKINSON, Thomas.—"Certain improvements in the con" struction of tram or railways, and in the carriages to be used " thereon."

The invention consists "in a peculiar construction in the form " of the rails, and embedding them so as to present a more equal " and uniform resistance, and whereby stone and wood may be " employed as rails as well as iron. . . . . The rails, if of iron, " are to be composed in preference of bars of wrought iron; the " upper parts present a plane surface slightly inclining towards " the outer side of the road, furnished with an inner edge raised

" laterally. Their lower surface has two projecting strengthening " ribs, which correspond with the usual lines of the pressure of " the wheels, the tyres or bands of which are to be slightly hol- " lowed in the centre." Grooves are cut in the sleepers into which the two ribs on the rail are made to fit exactly.

"The rails rest for their entire length on longitudinal pieces of " wood, which may be called sleepers. The pieces of wood are " sunk in the trenches, and are there supported. The bottom of " the trenches should be previously strongly compressed and con- " solidated, and after the pieces of wood or sleepers, with the " bearers or soles upon which they rest, are placed in the trenches, " all the spaces which exist on each side are to be filled up with a " thin cement, which will become hard and incompressible when " solid, and of that well known description which will harden " under the action of water composed of quicklime, sand, and " small fragments of stone. In addition, stone should be driven " into this cement by rammers, the more effectually and firmly to " fill up the spaces; . . . . the foundation will possess a slight " elasticity, which is necessary to produce a gentle motion, and " will conduce to the preservation of the locomotive machines " and of the carriages, and also of the road itself."

[Printed, 3*s*. 6*d*. Drawings.]

A.D. 1838, November 3.—N° 7852.

DEVILLE, JEROME.—"Improvements in railroads and in the " carriages to be used thereon."

This invention, contrary to the title, only refers to carriages, and will be found abridged in another series.

[Printed, 10*d*. Drawing.]

A.D. 1838, December 6.—N° 7896.

CAVAIGNAC, GODEFROY.—(*A communication.*)—"Improve- " ments in apparatus for transporting materials for various pur- " purposes from one place to another, particularly applicable to " road cutting and embankments."

According to the inventor's system, the wagons are raised to to top of an incline of railway by means of an endless chain, or a system of levers. From the top they run by their own weight to the tipping place at a lower level, thence they return, also along a railway, to the point from which they started. The railway is supported on framing, and is provided, if necessary, with turntables and switches, &c. The rails are joined in various ways, by fishing plates of wood inside and iron out, or wood alone, or "by fire."

A wagon is also described.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1838, December 17.—N° 7911.

HAWKSHAW, John.—"Certain improvements in mechanism "or apparatus applicable to railways, and also to carriages to be "used thereon."

This invention relates to a self-acting arrangement of apparatus, called by the inventor a "switch or shunt protector," by which the main line of rails cannot be left unconnected. Also, to the "application of an extra plate to the moveable rails, which have "hitherto been objectionable, in order to render their use per"fectly safe, as this plate, being furnished with an inclined plane, "and being also used with the improved shunt protector, enables "double rails to be employed in some cases with more convenience "than switches or shunts, and is thus of considerable advantage."

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 74.]

A.D. 1839, January 3.—N° 7920.

CLEGG, Samuel.—"New improvement in valves, and the "combination of them with machinery."

This invention consists "in a method of constructing and "working valves in combination with machinery." These valves are similar to those commonly used in air pumps. "The extremity "or edge of these valves is caused to fall into a trough containing "a composition of bees'-wax and tallow, or any substance or "composition of substances which is solid at the temperature of "the atmosphere and becomes fluid when heated to a few degrees "above it."

"After the valve is closed and its extremity is lying in the "trough, the tallow is heated sufficiently to seal up or cement "together the fracture round the edge or edges of the valve "which the previous opening of it had caused; and then the heat "being removed the tallow again becomes hard, and forms an

" air-tight joint or cement between the extremity of the valve and
" the trough."

" When it is requisite to open the valve, it is done by lifting it
" out of the tallow, with or without the application of heat; and
" the process of sealing it is repeated every time it is closed (this
" combination of valves with machinery is made in the applica-
" tion of these valves to railways or other purposes, by a line
" of partially exhausted pipes, for the purpose of obtaining a
" direct tractive force to move weights either on the railway or
" otherwise)."

This is effected " by laying down a continuous length of pipe,
" containing a lateral slit or opening its whole length. A piston
" is made to travel in this pipe by exhausting or drawing out the
" air from the pipe on one side of the piston, and allowing free
" access to the atmosphere on the other side of it; an arm from
" this piston passes through the lateral opening to attach to the
" carriages on the railway, and draw them along with it. The
" whole of this lateral opening is covered by the valve before
" described, and that part of it through which the arm passes is
" lifted to allow it to pass, and also for the admission of air to
" the piston, by means of an apparatus connected to the arm."

" The carriage to which this arm is attached is called the
" driving carriage; to the hinder part of this carriage a long
" heater is attached, which is drawn along by it upon the tallow
" contained in the trough, and reseals the valve ready for the
" next train, which repeats the operations above described at
" certain distances. Steam engines and air pumps and other
" apparatus are fixed for exhausting the pipe."

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 3 (*enlarged series*), p. 341; Mechanics' Magazine, vol. 33, p. 86; also vol. 37, p. 60; Engineers' and Architects' Journal, vol. 3, p. 253, 259, and 407.]

A.D. 1839, February 23.—N° 7981.

PRATT, Thomas.—" An improved capstan and winch for pur-
" chasing or raising ships' anchors without the application of a
" messenger in which there is no fleeting or surging, and for
" raising coals and other articles, and things out of coal and
" other mines, and also for drawing and working on railways
" with drawing pulleys with flat or round ropes."

" It consists in the application of a winch apparatus to the
" working of ropes on railways, and in employing grooved wheels

" driven by suitable cog wheels receiving motion from a steam " engine or other power." The rope is not coiled on the drum but simply passed through the winch.

[Printed, 1*s*. Drawing. See Inventors' Advocate, vol. 1, p. 67.]

A.D. 1839, March 27.—N° 8017.

NEWTON, William.—(*A communication.*)—" Certain improved " machinery for cutting and removing earth; which machinery is " applicable to the digging of canals and the levelling of ground " for railways or ordinary roads, and similar earthworks."

The patentee claims the form and arrangement of rotary cutters, mounted in a carriage, which are made to break the ground as the carriage advances, " and also to conduct or throw " the earth thus loosened into a series of travelling buckets or " shelves, which carry it up out of the excavation, and deliver " it into a series of troughs moving in a transverse direction, " for the purpose of carrying off and discharging the loose earth " raised into carts or into any convenient situation by the side of " the excavation."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 57; Inventors' Advocate, vol. 1, p. 131.]

A.D. 1839, April 9.—N° 8026.

PARKIN, Thomas.—" Improvements in railroad and other " carriages, in wheels for such carriages, and in roads and ways " on which they are to travel."

The first " improvement on railroads consists in forming the " rails of hard wood placed with the end of the grain in a vertical " or nearly vertical position, laid either in a bed of concrete, or of " cement, or of gravel." The second, " in the laying down of " tram rails and edge rails in the same continuous line along the " common road, the tram rails being generally laid at the crossings " of streets or roads, and in front of buildings, and the edge rails " at other parts of the road, in combination with certain com" municating inclined pieces for the wheels to pass smoothly from " one kind of rail to the other, and in combination also with a " mode of securing both sorts of rails down upon bearers of " wood, by nails driven through the iron and through the wood " into continuous bearers of asphalte, or other suitable coment laid " in trenches dug in the road, the points of the nails being made

" thicker or broader than the shanks, and driven in while the " cement is soft, so that the cement may collapse around the " neck of the nail, and prevent its being drawn out."

[Printed, 1*s.* 6*d.* Drawings. See Repertory of Arts, vol. 13 (*new series*), p. 157; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 256; Mechanics' Magazine, vol. 31, p. 146; also vol. 32, pp. 162, 258, 353, and 418; and vol. 49, p. 20; Patent Journal, vol. 5, p. 139; Webster's Patent Law, p. 140, case 158; Inventors' Advocate, vol. 1, p. 147; Carpmael's Reports on Patent Cases, vol. 2, p. 677; Law Journal, (*Exchequer*), vol. 23, p. 217 (*with Disclaimer*).]

A.D. 1839, May 22.—N° 8073.

HARPER, THOMAS.—"Certain improvements in railways or tramroads :—

Consisting "in a new method of forming and fixing the chairs " on which the rail is placed." Separate pieces or cheeks of cast iron are used; between such pieces or cheeks is introduced a wedge or block of wood, or metal, which is made to fit tightly, and thereby to secure the cheeks in a firm position in the mortice in the sleeper to receive the rail, which bears on the wedge and between the cheeks in the usual way.

[Printed, 6*d.* Drawing. See Inventors' Advocate, vol. 1, p. 243; Engineers' and Architects' Journal, vol. 4, p. 88.]

A.D. 1839, August 17.—N° 8200.

KOLLMAN, AUGUSTUS GEORGE.—"Improvements in railways, " and in locomotive and other carriages."

The invention consists "in applying wooden rails of a series of " blocks side by side, with their grain upwards, somewhat higher " than the iron rails on which the wheels of the locomotive " carriages run."

"These additional rails are side by side with the iron rails, " and are fixed in such places as there is an inclined plane to be " ascended; . . . . and the driving wheels of the locomotive " carriage are constructed of two diameters, the larger diameter " running on the iron rails of the railway, and the smaller diameter, " when the carriage comes to an inclined plane running on the " extra wooden rails, and for the time being carrying the loco- " motive carriage, for which purpose it is roughened, so as to " hold more effectually."

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 370; Inventors' Advocate, vol. 2, p. 179; Engineers' and Architects' Journal, vol. 8, p. 72.]

A.D. 1839, September 16.—N° 8219.

DODDS, Isaac, and OWEN, William.—"Certain improve-
" ments applicable to railways and in the construction and
" manufacture of wheels, engines, and machinery to be used
" thereon, part or parts of which are applicable to other engines,
" and which wheels without a flange are also applicable for use
" on turnpike roads."

The invention, so far as it is included in this series, consists
" in novel constructions and modes of working the switches on
" lines of railways, which are designed to prevent the carriages
" getting off the line in the event of the switches being improperly
" placed . . . . and to secure the more perfect guidance of the
" trains from one line of rails to another. A rocking cradle is
" mounted upon pivots, and vibrates on stationary bearings;"
it is necessary that the cradle should lie in an inclined position
which is effected by a weighted bell-crank lever "connected by a
" slider, upon which are fixed two inclined planes working against
" the surfaces of two other inclined planes fixed to the under
" parts of the cradle."

"The weight on the lever being allowed to fall the inclined
" planes are forced towards the left hand, and the cradle is
" thereby tilted, so as to raise its right-hand side," so that "the
" higher side of the cradle will form with the right-hand rail a
" groove, which guides" the train on to the required line; but if
it is to shunt to the left, "the weighted lever must be raised by
" hand, which will draw the inclined planes to the right, and raise
" the left-hand side of the cradle," by which the carriage will be
conducted towards the left hand.

[Printed, 3s. Drawings. See Inventors' Advocate, vol. 2, p. 227.]

A.D. 1839, November 21.—N° 8276.

FARAM, John.—"Certain improvements in the mode of con-
" structing switches for connecting different lines of railway, or
" distinct railways, and for passing locomotive, steam, and other
" engines, and railway carriages and waggons, from the one to
" the other of such railways or rail, and for certain apparatus
" connected therewith."

The object of the invention "is so to arrange the apparatus of
" the switches, together with apparatus in connection with the

" train of carriages, that a person conveyed by the train when " passing from a single line of rails to either of two lines of " rails, may have the power of moving the switches into a " proper position for the train to take the proper direction, " and thus render it unnecessary to have persons attending " to place the switches correctly for the next coming train." In constructing apparatus according to the invention, the patentee says, "it will be desirable so to arrange the parts that " the carriage coming in contact with the apparatus in connec- " tion with the switches that the blow should be as progressive " as possible, and not suddenly, and that the apparatus in con- " nection with the train should travel as long a distance as " possible after touching the apparatus in connection with the " switches, in order to effect a transposition of the moveable parts " of the bars to produce a connection between the proper lines " of rails, for it is important to avoid shocks."

The general arrangement of switches, with apparatus arranged according to the invention is, that the moving parts form parts of the rails on which the carriage run, and consists in an angle line or pair of rails, which is capable of being put in connection with either of the two pairs of rails, and this is brought about by the turning over of the bars or rails, each moving on cranked axes, consequently allowing the bars or rails to make a direct connection from the line of rails with either of the lines; by this arrangement, when the flanch of a wheel comes in contact with either of the bent bars, the switch bars will be turned over, and ensure the carriage or train of carriages passing from one line to another.

[Printed, 1*s*. 6*d*. Drawings. See Inventors' Advocate, vol. 2, p. 339.]

A.D. 1840, March 3.—N° 8410.

RANGELEY, JOHN.—Improvements in the construction of railways and in the means of applying power to propelling carriages and machinery.

The invention relates to mode of "constructing railways in " such a manner that the power employed for propelling car- " riages thereon is caused to be transmitted by a series or train of " wheels moving on axles supported on stationary bearings fixed " in the line of railway, and in such manner that the carriages " for passengers and goods are caused to pass over and be acted "on and moved by the rotatory motion of such wheels by the "contact and friction of their peripheries acting against the under "sides of a pair of running rails attached to each carriage."

[Printed, 1s. Drawing. See Engineers' and Architects' Journal, vol. 3, pp. 322 and 372; Inventors' Advocate, vol. 3, p. 163.]

A.D. 1840, June 9.—N° 8539.

SHUTTLEWORTH, John George.—"Certain improvements "in railway and other propulsion."

The claims of the inventor are, first, "the application of the "power of a column or body of water acting against a piston in "a tube, to which piston" the carriage to be propelled is fastened; and, secondly, an "improved guide neck to the said "piston for raising and conveying to its proper place the flexible "valve or stuffing required to fill the slot or space left open in "the upper part of the propulsion tube."

[Printed, 10*d*. Drawing. See Inventors' Advocate, vol. 3, p. 389; Mechanics' Magazine, vol. 33, p. 502; Engineers' and Architects' Journal, vol. 4, p. 20, and vol. 5, p. 406; Inventors' Advocate, vol. 5, p. 41.]

A.D. 1840, August 7.—N° 8595.

SMITH, Andrew.—Certain improvements in carriage wheels, rails, and chairs for railways.

"A longitudinal sleeper of wood of the ordinary size is embedded "in the ground upon which the rails rest. The rails themselves "are made of the common square bar iron, or of square bar iron "formed and manufactured of the size required."

"The sides of the square of the rail are about one-third more in "width than the depth of the sides in the groove in the wheel "tyre, which prevents the wheel from coming in contact with the "chair and sleeper. This bar of iron is laid in a groove cut in "the sleeper, ... and when so laid it presents one of "the angles of the square upwards, and corresponds with the "groove in the tyre of the wheel, and upon which the wheel "runs. The chair for connecting and supporting the rails "is made of wrought or cast-iron. . . . . It clips the four "sides of the bar in a dovetail form, and the chair itself is let "into and bolted to the wood sleeper; one of these chairs is "placed at the junction for connecting the separate and con-"tinuing rails," which are made "about twelve feet long by two

" inches and a quarter square, and when of that length one chair " in the middle of the bar, and those placed at the junction of " every two bars, are sufficient to attach and keep the rail to the " wooden sleeper." The patentee claims the adaptation of common square bar iron let into a wooden sleeper to be used as rails for railways, and the chair for connecting, fixing, and fastening the rails on railways.

[Printed, 6*d*. Drawing. See Mechanics' Magazine, vol. 34, p. 189; Inventors' Advocate, vol 4, p. 100; Engineers' and Architects' Journal, vol. 4, p. 124.]

A.D. 1840, September 22.—N° 8638.

PAIN, THOMAS.—" A plan by means of which carriages may be " propelled by atmospheric pressure only without the assistance " of any other power; being an improvement upon the atmo- " spheric railway now in use."

[No Specification enrolled.]

A.D. 1840, September 24.—N° 8644.

PINKUS, HENRY.—" Improvements in the method of applying " motive power to the impelling of machinery, applicable, " amongst other things, to impelling carriages on railways, on " common roads or ways, and through fields, and vessels afloat, " and in the methods of constructing the roads or ways on which " the carriages may be impelled or propelled."

The motive force to effect propulsion on railways is termed " gaso-pneumatic." On a line of railway of the ordinary construction or any modification thereof, is laid a series of common gas mains or pipes of any convenient diameters; " these are laid, " if on a double track, in a centre line between the two tracks of " railway, at distances of about two miles." A branch (or branches) of any required length is laid from the mains, and to these where they occur is connected and established the gas explosive aparatus or engine or parts thereof being fixtures upon the lines of railways. From the engine or apparatus so to be constructed, is transferred the power " induced at each station " along a line of said railway in opposite directions by the effect " of the explosive mixture of gases and air, the former supplied " through said mains from gasometer stations placed at con- " venient distances along said railway."

The inventor also proposes to use steam in a similar manner, and also electricity.

[Printed, 6s. 8d. Drawings. See Mechanics' Magazine, vol. 34, p. 299; Inventors' Advocate, vol. 4, p. 218; Engineers' and Architects' Journal, vol. 4, p. 174.]

A.D. 1840, October 15.—N° 8659.

PETTIT, Robert.—" Improvements in railroads, and in the " carriages and wheels employed thereon."

" Four or more horizontal wheels are employed mounted on " vertical axles underneath the carriage, and to prevent their " rattling against the rails," rope-yarn, or other soft substance is inserted " into a groove round the periphery of each wheel, these " wheels may bear against the inner side of the parallel rails, and " by revolving freely on their axes keep the carriage in its proper " position on the line of railway." The rails upon which the carriages run are merely " flat bars or plates of iron, screwed or " otherwise, fastened on to longitudinal sleepers or blocks of " wood, and the guide rail in the middle of the line is that against " which the horizontal wheels bear."

"This is employed for the purpose of keeping the engine and " carriages in their proper positions, and is equidistant from both " the side rails."

"This peculiar construction of railway will be found useful " when one line of road branches off from another," the centre rail being moveable as a switch. A modification of the central rail is described wherein the only difference is the addition of top flanges, "which flanges will restrain the horizontal wheels " from being raised out of their proper position, and prevent " their passing over the top of the rail from any accidental " cause."

[Printed, 1s. 6d. Drawings. See Mechanics' Magazine, vol. 34, pp. 331 and 350; Inventors' Advocate, vol. 4, pp. 202 and 330; Engineers' and Architects' Journal, vol. 4, p. 159.]

A.D. 1840, October 15.—N° 8663.

PINKUS, Henry.—" An improved method of combining and " applying materials applicable to formation or construction of " roads or ways."

"In order to form the paved ways of streets for the use of " superstructures of wood, stone, or similar material a founda- " tion " is formed "of rough close-set rubble stones," broken stones, or bricks. “The upper interstices between the stones “ should be filled up compactly with chips of broken stones, so “ as to form a compact mass, which when laid along a street or “ road should have a proper curvature for drainage equal to a “ declination about nine inches in twenty feet.”

“The surface should be rammed or rolled so as to form an “ even surface.” In beds of foundations so formed “buttress “ sleepers” are laid; “these constitute the abutments of arches of short span, “by which the road or street is divided trans- “ versely. Transums or ties may be placed at convenient dis- “ tances to maintain parallelism of the buttress sleepers when “ necessary on loose soils, or the buttresses may be laid on ends “ of piles.”

The sleepers form the skeleton, so to speak, of an interwoven arched pavement of blocks and iron rods, the latter serving to unite the whole.

“On lines of railway or embankments or cuttings, where loose “ soil occurs, the textile pavement may be applied with advantage “ in lieu of ordinary ballasting; the railway bars may lay along “ on the pavement.”

“In order to facilitate the impelling of carriages or trains over “ ascending planes,” a fixed rail or centre rail is laid down on a continuous sleeper.

“At the foot of the plane the rail is tapered to a thin section “ and gradually increases for one hundred feet.” To a locomotive engine is applied “an adhesion apparatus” so that when the locomotive “approaches the foot of an inclined plane, the bar “ entering between the adhesion wheels, and gradually getting “ under will prevent any shock on the entry of the rail. . . . . “ The adhesion of these wheels on the rail will assist the bite or “ adhesion of the driving wheel of the locomotive, and enable the “ engine by its power to overcome the gravity of the load when “ on the inclined plane. When the train reaches the summit of “ the incline, the rail gradually decreases in width, and is dis- “ continued, and the adhesion wheels” will then approach and “ roll upon each other.”

The inventor also combines with the road “self-acting or self- “ regulating indicators for marking the times of arrivals and “ departures” of trains.

[Printed, 4*s*. 2*d*. Drawings. See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 251; Mechanics' Magazine, vol. 34, p. 334; Inventors' Advocate, vol. 4, p. 261.]

A.D. 1840, November 12.—N° 8699.

BIRCH, Eugenius.—" Improvements applicable to railroads, " and to the engines and carriages to be worked thereon."

This invention consists in arranging parts of railways, and also " apparatus applied to engines and to carriages moving thereon, " that the steam of locomotive engines may be wholly cut off " from the engines, or regulated or affected by the movement of " the locomotive carriage along the railway, and parts of the " apparatus may be so arranged that persons stationed at parti- " cular parts of a line of railway may bring such apparatus into " use; and further, breaks may be brought into action indepen- " dently of as well as by persons travelling with engines and " carriages, thus materially reducing the possibility of accidents " from neglect or want of judgment of the persons conducting " trains of carriages on railways; and lights may be shown and " whistles sounded by apparatus applied to railways, and to the " engine or carriages moving thereon, to be brought into use " by the movement of the engines and carriages along a line of " railway."

[Printed, 1s. 6d. Drawings. See Mechanics' Magazine, vol. 34, p. 390; Inventors' Advocate, vol. 4, p. 325.]

A.D. 1840, December 16.—N° 8741.

BEATTIE, Joseph.—" Certain improvements in locomotive " engines, and in carriages, chairs, and wheels for use upon " railways, and certain machinery for use in the construction of " parts of such invention."

" In the bottom of the iron part of the chair there is a space " left out in the casting, into which is placed a piece of com- " pressed oak or other wood, with the fibre parallel to the plane " of the base of the chair upon which the rail is seated; there is " also a space cast out of the inside cheek of the iron part of the " chair, in which is also placed a piece of oak or other wood, then " the key is driven in."

[Printed, 1s. 8d. Drawings. See Mechanics' Magazine, vol. 35, p. 56; vol. 65, p. 405; and vol. 67, p. 6; Inventors' Advocate, vol. 5, p. 22.]

A.D. 1840, December 18.—N° 8745.

HANDCOCK, Elias Robison.—" Certain improvements in " mechanism, applicable to turn-tables for changing the position

" of carriages upon railroads, which improvements are also ap" plicable to castors for furniture, and other purposes," consisting in " a vertical bearing shaft, which is fixed into the foundation " frame by its lower end, which is partly tapered, and having at " its upper end a steel centre step," and two gun-metal collars, " which fit loosely around the vertical bearing shaft, and within " recesses made in the outer cylinder." A circular flange is bolted " to the centre of the table or platform at its under side. " At the middle of this circular flange is the conical pivot, the " apex of which is formed of steel, and works in the stud step." A massive flange is cast "to the outer cylinder, to which are " bolted a series of stay bars, the upper ends of which are bolted " at equidistant points near the periphery of the table or platform. " The effect of these stays is a general support and stability to " the table or platform."

[Printed, 2*s.* Drawings. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 126; Mechanics' Magazine, vol. 35, p. 9; Inventors' Advocate, vol. 4, p. 405.]

A.D. 1840, December 23.—N° 8750.

THORNTON, George.—" Certain improvements applicable to " railways, locomotive engines, and carriages."

The patentee claims as secured to him by this patent " a kind " of medium guage (say about six feet) of rails upon railways," as superior to the existing gauges of four feet eight and a half inches and five feet.

[Printed, 1*s.* 2*d.* Drawings. See Repertory of Arts, vol. 17 (*new series*), p. 345; Mechanics' Magazine, vol. 34, p. 14; Inventors' Advocate, vol. 5, p. 4.]

A.D. 1841, January 14.—N° 8785.

HANCOCK, Walter.—" Certain improved means of preventing " accidents on railways."

Part of this invention has reference to an arrangement of points, which are acted upon by the train itself. An inclined plane on the engine comes in contact with the end of a lever, which in its turn communicates movement to the point. The arrangement may be adapted either to close or to open the points. It is moreover so contrived that, by means of long rods, the movement of the switch shall be fully completed before the engine reaches it, and, finally, a hand switch lever is provided, so that if it should be required to transfer a train to the opposite line, there may be sufficient time, after the engine has passed the friction lever at the lowest rate of speed, to open the switch in the ordinary way for the train.

Another part relates to signals, which may, if necessary, be combined with the above system of points.

[Printed, 1*s.* 10*d.* Drawings. See Mechanics' Magazine, vol. 35, p. 79; Inventors' Advocate, vol. 5, p. 53.]

A.D. 1841, January 28.—N° 8818.

HARRISON, William Currie.—"An improved turning-table "for railway purposes." The invention consists "in supporting "the revolving plate or upper platform of the turning-table, as "also its stays, braces, arms, and supports, on the top of a fixed "post, well braced, and resting on or planted in the ground, the "top of which post forms a pivot for the table to turn on, while "support arms radiating from a framework (the weight of which "is also sustained on the post) moving round the bottom part of "the post with friction rollers, and fastened to the outer edges "of the plate, stay the plate at all sides, and keep it steady to "receive the superincumbent weight of carriages, or whatever is "to be turned upon it."

[Printed, 8*d.* Drawing. See Mechanics' Magazine, vol. 35, p. 173; Inventors' Advocate, vol. 5, p. 84; Macrory's Reports, vol. 1, pp. 4, 11, and 13; Common Bench Reports, vol. 12, p. 831; Law Journal (*Common Pleas*), vol. 22 (*new series*), p. 57; Jurist. vol. 17, p. 304; Law Times, vol. 19, p. 158; and vol. 20, p. 112.]

A.D. 1841, February 8.—N° 8837.

OLDHAM, Elisha.—"Certain improvements in the construc"tion of turning-tables to be used on railways," which consist "in mounting the platform or table at its centre on an upright "pin or pivot, the sides of the platform or table being supported "by stationary antifriction rollers when a heavy weight is brought "on to it."

[Printed, 6*d.* Drawing. See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 93; Mechanics' Magazine, vol. 35, p. 176; Inventors' Advocate, vol. 5, p. 102; Engineers' and Architects' Journal, vol. 4, p. 429.]

A.D. 1841, February 8.—N° 8840.

SCOTT, Joseph.—"Improvements in constructing railways, "and in propelling carriages thereon, which improvements are "applicable to raising and lowering weights;" consisting in a

" mode of applying to railways cog wheels at intervals along the " line of railway, such cog wheels receiving a continuous rotatory " motion by suitable gearing; and further, such cog wheels are " placed at such a distance apart as at all times to have one of " them in operation with a toothed rack applied to one of the " railway carriages of a train, and thus are the carriages pro- " pelled."

[Printed, 1*s*. Drawing. See Mechanics' Magazine, vol. 35, p. 176; Inventors' Advocate, vol. 4, p. 203; and vol. 5, p. 99.]

A.D. 1841, February 15.—Nº 8847.

RANSOME, JAMES, and MAY, CHARLES.—" Improvements in " the manufacture of railway chairs, railway and other pins or " bolts, and in wood fastenings and treenails," relating, " first, " to a mode of casting railway chairs by means of metal side " surfaces in sand mould with metal or other cores; secondly, to " a mode of making railway and other pins or bolts, and wood " fastenings and treenails, by forcing them into moulds so formed " as to retain them under compression for any required length " of time, and by subjecting them to heat when under com- " pression in moulds."

[Printed, 1*s*. Drawing. See Repertory of Arts, vol. 16 (*new series*), p. 209; Mechanics' Magazine, vol. 35, p. 206; Inventors' Advocate, vol. 5, p. 117; Engineers' and Architects' Journal, vol. 5, p. 200.]

A.D. 1841, June 5.—Nº 8977.

GIBBS, JOSEPH.—" Certain improvements in roads and rail- " ways, and in the means of propelling carriages thereon." The first " consists in constructing the bridges or viaducts which may " be required in the formation of roads and railways partly in the " manner of ordinary arc bridges, and partly in the manner of " the suspension bridge, so as to combine in one structure the " advantages of both systems of construction without any abut- " ments being required to resist the thrust of the arched bridge, " or any land ties to hold the suspension chains in their place." The second " consists in making common roads and that descrip- " tion of railways called tramways of wooden blocks, laid and " combined in such a manner that every block shall receive a " support from each of those adjoining it" by means of key pieces, made either of wood or iron. The seventh " is for causing " carriages to run on common roads, and is effected by laying " down rackways of blocks of stone or other suitable materials,

" as now practised, except that the joints are to be laid askew, " to give a smoother motion to the carriage wheels which are " intended to run thereon between the blocks; a continuous " longitudinal piece of wood is laid, the upper edges of which " are chamfered or bevelled off," on this a wheel runs, only " touching the chamfered edges; the wheel is provided with a " flange on each side, but the flanges do not touch the sides of " the timber. This wheel runs loose on the axle, and the hole " through which the axle runs is larger than the diameter of " the shaft on which it is placed, ... by this contrivance " the wheel always drops upon the rail, and guides the carriage " wheels on the blocks, consequently they do not require flanges; " but in order to keep the guide wheel in its place on the shaft " a plate of iron is accurately turned and keyed thereon upon " each side of the guide wheel; these plates of iron, or discs, " always keep the wheel in its proper place, but allows the guide " wheel to sink down between them upon the centre rail." The ninth describes "a railway formed of longitudinal and transverse " sleepers, with rails of any approved form. Upon some of the " transverse sleepers, at convenient distances, are fixed bearings " for friction wheels or drums in pairs, which wheels or drums " serve as bearings for a cylindrical shaft of wood or other " material, which is thus enabled to be made in a continuous " length for any distance that may be required. Attached to one " or both ends of a carriage is a wheel, the outer surface of which " is in contact obliquely with the surface of the shaft, and consequently has its axis oblique to the axis of the said shaft." There is also "a contrivance for raising or depressing the wheel " when required, being furnished with handles for that purpose." " A slow motion being given to the shaft by any approved means, " and thereby communicated to the wheel, the carriage will be " propelled with a great velocity, which may be increased or " diminished according to the angle at which the wheel is set to " the shaft, and to the proportion that the diameters of the said " wheel and shaft bear to each other."

[Printed, 4*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 35, pp. 465 and 490; and vol. 36, p. 1.]

A.D. 1841, July 7.—N° 9017.

ONIONS, George.—" Improved wheels and rails for railway " purposes." The invention " consists of an arched base manu-

" factured of common cast iron, with a groove running along the " centre thereof and into which groove a rail, made either of " iron cast from Cumberland or Lancashire ore, and afterwards " rendered malleable by annealing, or made of wrought iron, is " affixed. The base of such rail" is "cast singly or doubly; if " doubly, by means of connecting substances of iron."

[Printed, 4*d*. No Drawings. See Mechanics' Magazine, vol. 36, p. 75; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 258.]

A.D. 1841, December 16.—N° 9181.

AUSTIN, Charles Edward.—" An apparatus for what is " commonly called changing the line on railways."

[No Specification enrolled.]

A.D. 1842, January 22.—N° 9231.

MERTENS, Antoine.—" Improvements in covering surfaces " with wood." " The pieces of wood, which may be of any " shape or form, but should be all of the same depth, are " placed in a frame side by side, and firmly wedged or screwed " into close contact. Grooves are next cut on the under surface, " extending from side to side, and traversing each of the " pieces of which the block is composed, and in these grooves " are inserted laths or tongue pieces. Other grooves are then " cut transversally to the former, and partially cutting through " the tongue pieces; and into these," also tongue pieces are inserted, "and asphaltum, mastic, gypsum, or any other suitable " cement, is run into the grooves and poured over the under " surface, which completes the process." The pieces of wood may be placed with their fibres vertical or horizontal, according to the wear to which the surfaces are exposed. The improvements also consist "in a method of covering cast-iron rails for " railways, so as to protect them in a great measure from the " shocks and the consequent risk of fracture to which they are " exposed when the wheels of the carriages run in immediate " contact with the iron rail." To apply this, the rail is formed with a groove on its upper surface of a dovetail form, and filled with blocks of wood, placed with the fibre vertical, of about three to five inches long, and cut to fit the groove, so that the whole of the groove is covered by the wood.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 94.]

A.D. 1842, March 7.—N° 9281.

DUNCAN, John.—(*A communication.*)—"Improvements in " machinery for excavating soil." Two machines are described, one applicable to the construction of "railways," &c., the other to dredging purposes.

The former consists of crane, carried on wheels which move along a temporary railway. This crane, which may be turned round either to the right or left to facilitate loading of wagons, carries a "scraper" or "digging tool." This scraper is furnished with a cutting edge or teeth, and is suspended by tackle at the outer end of the crane. The whole apparatus is actuated by a steam engine. Its operation is thus:—The scraper is forced forward into the earth, then raised vertically with its load of earth, swung round to the wagon, emptied, and returned. It will then descend from its elevated position in a diagonal direction to the ground for a second operation.

[Printed, 3s. 8d. Drawings. See London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 237; Record of Patent Inventions, vol. 1, p. 110; Transactions of the Society of Arts, vol. 54, p. 166; Engineers' and Architects' Journal, vol. 6, pp. 147, 268.]

A.D. 1842, March 21.—N° 9298.

JESSOP, Sydney.—"An improved mode of preparing wrought " iron intended for wheel tires, rails, and certain other articles." The invention consists "in carbonizing or hardening wrought " iron after it has been formed or fashioned into shapes appli" cable to wheel tires, to wheel rims, to rails, to plates, or to " trams, switches, or the like articles, in such manner and on " such parts as when so applied will cause them to present " hardened surface for their wearing surfaces."

[Printed, 1s. Drawings. See Record of Patent Inventions, vol. 1, p. 139.]

A.D. 1842, August 31.—N° 9455.

GUITARD, Charles Frederick.—(*A communication.*)—"Cer" tain improvements in the construction of railways." The invention consists "in substituting sleepers of iron, of such " qualities and constructed in such manner that they are free " from the disadvantages of, and both cheaper and much more " durable than the wooden ones," and "in combining with the " said sleepers iron chairs suitably adapted thereto." Of these improved sleepers and chairs, eleven different varieties are represented in the Drawings.

[Printed, 2*s*. Drawings. See Mechanics' Magazine, vol. 39, pp. 274 and 433; Practical Mechanics' Journal, vol. 4, p. 29.]

A.D. 1842, September 16.—N° 9473.

JAMES, William Henry.—" Certain improvements in railways " and carriage-ways, railway and other carriages, and in the modes " of propelling the said carriages; parts of which improvements " are applicable to the reducation of friction in other machines."

The invention consists in "forming an elevated railway or " carriage-way for the conveyance of passengers and goods by " means of a series of parallel rods, bars, wires, or strips of metal, " or other suitable materials, carried over a series of horizontal " intermediate spring bearings, placed at intervals across the line " of railway, on post, pillars, or other suitable supports firmly " fixed in the ground; such rods, bars, wires, or strips being " constantly kept in a state of tension by mechanical means;" and " in forming an elevated rail or carriage-way by building two " walls . . . . parallel to each other, and of equal height . . . . " and placed at a distance apart . . . . equal to the breadth of " the proposed rail or carriage-way. The space between the walls " may be left vacant, or arched over," or may be " filled up with " concrete or " other suitable materials," so that the entire " structure shall form one solid wall."

" Overhanging side rails " are provided to secure the safety of the carriages through the intervention of guide rollers. Piles or pillars may be substituted for the walls.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1842, December 3.—N° 9535.

WILD, Charles Heard.—" An improved switch for railway " purposes." The invention consists " in the use of safety " tongue rails, either fixed and the ordinary rails moveable into " line with them, or moveable themselves into line with the ordi- " nary rails; one main feature of the invention being, that what- " ever the mechanical means adopted may be to effect either of " these movements, those means must be such as will cause the " moveable rails to move through certain different degrees of

" space, though these means are acted upon by one lever always " moving through one uniform degree of space."

[Printed, 1*s*. 6*d*. Drawings. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 271; Engineers' and Architects' Journal, vol. 10, p. 9.]

A.D. 1842, December 29.—N° 9580.

DE WYDROFF, Baron VICTOR.—" Improvements in the con-" struction of railways, and in wheels to run on railways, and in " apparatus for clearing the rails." " Round blocks " are placed every two yards on well rammed ground or a prepared foundation, " and transverse sleepers of cast iron made hollow, in which there " is a slope or cutting destined to receive the longitudinal bearers " at a right angle. These longitudinal bearers are twelve inches " square, and are placed at a right angle in the slope of those " blocks or iron sleepers in such a manner that one of the diago-" nals of the square is perpendicular to the surface of the earth." The bearers are elevated about three inches above the ground, and the rails about eighteen inches. " The blocks are kept in their " places by means of wrought-iron bars which extend across them " and the longitudinal bearers from rail to rail. These bars are " fastened by pins inside and nuts outside." The transverse sleepers are placed at the joints of the bearers, and are kept in their places by iron bars, thus forming together a perfect framework above the ground, and thus all parts of " the railway may " readily be examined and repaired." On the " top angle of the " bearer, slightly squared, is laid the hollow rail, which being " thus placed presents at all points of its surface the same elasti-" city of resistance;" and " this form of rail will resist considerable " pressure, and cannot readily be flattened."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 39, p. 45.]

A.D. 1843, January 11.—N° 9582.

BAILEY, CRAWSHAY.—" Certain improved constructions of " rails for tramways and railways," " in a peculiar form given to " the rails, by which they are enabled to answer the double pur-" poses of conducting locomotives and other carriages having the " ordinary kinds of railway wheels with a flange on one edge, or " wheels without flanges."

" The rail has two surfaces for the wheels to run upon, the one

" elevated for" flanged wheels, and "the other lower and flat " for the wheels of tram and other wagons without flanges."

[Printed, 6*d.* Drawings. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 254.]

A.D. 1843, May 16.—N° 9727.

KETTLE, JOHN LUCENA ROSS, and PROSSER, WILLIAM, the younger.—" Improvements in the construction of roads and in " carriages to run thereon." The patentees claim the "mode of " constructing roads by combining tramways or surfaces of wood " with guide rails, in order that carriages with wheels having " plain tyres may run thereon."

[Printed, 10*d.* Drawing. See Repertory of Arts, vol. 3 (*enlarged series*), p. 154; Mechanics' Magazine, vol. 40, p. 206.]

A.D. 1843, June 22.—N° 9797.

ELLIS, SAMUEL.—" Certain improvements in weighing machines " and in turntables to be used on or in connexion with railways, " and in weighing machines to be used in other situations." " The patentee claims the doing away with friction rollers for the " support of the outer edge of the platform and the allowing the " said edge, when the platform is not required to be in motion, " to rest firmly and steadily on a fixed stationary bed or bearing, " and when required to be put in motion, the raising of the said " platform by a lever or levers, and the lifting of it on to a " central bearing point or pivot connected with a steelyard or " other weighing apparatus when required to be used as a weighing machine, and ready to be turned round when required to " be used as a turntable, thus, for the first time, combining a " weighing machine with a turntable for railway purposes." The patentee disclaims the words in the title "and in weighing " machines to be used in other situations."

[Printed, 1*s.* 8*d.* Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 137; Patent Journal, vol. 2, p. 645; Transactions of the Society of Arts, vol. 55, p. 131 (*with Disclaimer*).]

A.D. 1843, July 26.—N° 9855.

EYRE, EDWARD.—(*A communication.*)—" Certain improvements " in railways, and in the machinery or apparatus employed " thereon." The invention relates to the formation of embankments cheaply and quickly by a system of working the tipping wagons; and also in constructing the railway by employing an additional or centre rail, upon which the driving wheel of the engine runs, "the centre rail being serrated, fluted, or rasped " transversely, or laid down plain, according to circumstances."

[Printed, 10*d.* Drawing.]

A.D. 1844, February 24.—N° 10,078.

AITKEN, JOHN.—"Improvements in atmospheric railways." The inventor obtains the requisite vacuum in the traction pipes of atmospheric railways "by causing them to be filled with water, " and then, by means of eduction pipes . . . . descending from " the traction pipes" carrying off such water, "leaving a better " vacuum in the traction pipes than can with convenience be obtained by air pumps; or in place of such length of eduction " pipes," pumps can be used, "with short eduction pipes." The patentee also claims "the use of water for covering the longitudinal valve of the traction pipe so as to retain the vacuum " obtained therein."

[Printed, 8*d.* Drawing. See Repertory of Arts, vol. 4 (*enlarged series*), p. 217; Mechanics' Magazine, vol. 41, p. 190; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 318; Engineers' and Architects' Journal, vol. 7, p. 368.]

A.D. 1844, March 6.—N° 10,093.

BARLOW, WILLIAM HENRY.—"Improvements in the construction of keys, wedges, or fastenings for engineering purposes." The claim consists in making the above "of hollow " metal, so that a degree of elasticity may be obtained, together " with strength and lightness."

[Printed, 8*d.* Drawings. See Repertory of Arts, vol. 4 (*enlarged series*), p. 238; Mechanics' Magazine, vol. 41, p. 394; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 400; Engineers' and Architects' Journal, vol 7, p. 369.]

A.D. 1844, March 20.—N° 10,115.

DE CHARLIEU, ANDRÉ DROUET.—(*A communication.*)—"Improvements in rails for railways, and in wheels for locomotive " carriages." "A mode of manufacturing rails for railways by " applying to the sides of the rail an angular flange in order to " prevent the wheels of the carriage from running off the rail; " the flange may be either a part of the rail or it may be made in " a separate piece, and affixed by means of bolts or pins to the

" rail." The invention also consists "in applying to wooden or " other rails of the same shape flat metal bands or strips of iron " in such manner that the pressure of the wheel will take place " on those parts, so that the ordinary rail will not have to be " made so thick; these bands may be of iron or cast steel or " other thin metal."

[Printed, 6*d*. Drawings. See Repertory of Arts, vol. 4 (*enlarged series*), p. 355; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 241; Engineers' and Architects' Journal, vol. 7, p. 407.]

A.D. 1844, April 30.—N° 10,167.

SAMUDA, Jacob, and SAMUDA, Joseph D'Aguilar.—" Certain improvements in the manufacture and arrangement of " parts and apparatus for the construction and working of atmo- " spheric railways." The invention consists in "a method of " obtaining a vacuum to work atmospheric railways by using " close reservoirs filled with water in conjunction with tanks " placed at different altitudes, and allowing the water to run out " of the reservoirs into such tanks and returning the water back " to the reservoirs from such varied altitudes, whereby less power " is required to force the water back into the reservoir than if it " all run out at one level." By one arrangement "when the " vacuum requires to be formed in the main" a valve is opened " and the water descends by its gravity into the reservoir till the " pressure of the water in the reservoir combined with the atmo- " sphere closes the valve, and then a float having by this time " descended low enough, a tappet on the float rod disengages a " catch and allows" another "valve to open and the water to " flow into" another "reservoir, the object of filling separate " reservoirs with the water being to prevent the water descending " lower than is absolutely necessary, and thus avoid the cost of " pumping it back into the vessel from a lower level than is " requisite." "A mode of arranging level crossings for the " atmospheric railway is described as follows:—A cylinder fitted " with a piston is fixed at each level crossing and has its lower " end connected to the main pipe, so that when a vacuum is " formed in the main pipe the piston will descend by the pressure " of the atmosphere which is admitted above the piston, and the " piston, acting by means of its rod and the lever, turns a long " axis on its centre, and thereby raises the cover of the main " pipe and allows the arm of the train piston to pass." The joint of two main pipes is made by the insertion of a thin plate of metal into the body of the metal of the pipe at the joints. Various methods of working the valves are also described.

[Printed, 2s. 8*d*. Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 65: Artizan, vol. 4, p. 1; Engineers' and Architects' Journal, vol. 8, p. 119; Law Times, vol. 5, p. 141.]

A.D. 1844, April 30.—Nº 10,168.

MELVILLE, JOHN.—" Improvements in the construction and " mode of working railways." The rails on which the carriages run are formed of timber, and " the upper surface is flat, with a " plate of iron for the wheels to run upon, the surface of which " plate is slightly inclined at the curves, so that the inner edge is " rather lower than the outer ones. The wheels of the carriage " are formed without flanges, but the carriage is guided and " retained on the rails by means of two horizontal wheels con- " nected to the frame of the carriage, and running in a groove " formed midway between the rails, by means of two wooden " rails. At the curves it will be desirable to fix an iron plate for " the guide wheels to run along on the inner side of the outer " central rail."

An improved tramway is also described. Longitudinal sleepers are used, and the inside of each is cut into a groove or rebate, which rebate is lined with iron.

The inventor proposes to prevent carriages leaving the rails at curves by " placing a preventer tram plate between the rails and " nearly close to the inner rail, leaving a little more space between " them than is required for the flanches of the wheels, in the " cases where the wheels have flanches."

[Printed, 1s. 2*d*. Drawings. See Engineers' and Architects' Journal, vol. 7, p. 421.]

A.D. 1844, June 21.—Nº 10,232.

FONTAINEMOREAU, PIERRE ARMAND, le Comte de. — (*A communication.*)—" A new mode of locomotion, applicable to rail- " road and other ways." The invention consists " in the con- " struction and arrangement of a tube placed in the direction of " the railway, in such manner as to supply air locomotives run- " ning thereon with air as a motive power, by maintenance of an " air-tight yet progressive constant communication between the " said tube and the locomotives. The air may be used either in

" a compressed or rarefied state, and the locomotives " may have two cylinders with their rectilinear alternate movements, and the mechanism for the transmission of motion to the moving axis, as in common locomotives, or may be made similar to those having rotary engines. "The tube is constantly filled with compressed " air in one method, with rarefied air in the other," and "has at " certain distances orifices closed by ordinary valves. . . . . In " one method the air is compressed into the tube by means of a " stationary power putting in action pneumatic forcing pumps. " The tube, the valves of which open inwards, will do the service " of a boiler, and should be as long as the railroad, and be con- " stantly supplying the locomotive with the compressed air neces- " sary to its motion, and that during its rapid course. In the " other method the air is exhausted" by suction air pumps "and " the tube, the valves of which open outwards, will do the service " of a condenser, and the atmospheric air in endeavouring to " force an entrance will press upon the pistons and put them in " motion, thus causing the engine to run."

[Printed, 1*s*. Drawings.]

A.D. 1844, July 24.—N° 10,270.

BROCKEDON, William.—"Improvements in covering the " roofs of buildings in covering the valves used when propelling " by atmospheric pressure, in covering the sleepers of railways, " and in covering part of stringed and keyed musical instru- " ments" by "adapting and applying a preparation of india- " rubber" and sulphur "to the surfaces of valves used on the " pipes or tubes of atmospheric railways, and combining" it " with the upper surfaces of sleepers of railways, so as to produce " an elastic covering between the sleepers and the rails, and the " sleepers and the chairs."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 241; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 183: Artizan, vol. 3, p. 70; Engineers' and Architects' Journal, vol. 8, p. 159.]

A.D. 1844, September 12.—N° 10,317.

FLOCKTON, Webster.—(*A communication.*)—"Certain im- " provements in machinery or apparatus for sweeping or cleansing " streets, roads, or ways," consisting "in novel machinery by " which a series of brooms or brushes connected to a carriage

" may be made to move horizontally over the street, road, or way " in a circular direction as the carriage advances, for the purpose " of sweeping " the dirt " into a heap by the side of the carriage, " from whence it is to be afterwards taken up by hand labor " into mud carts or other suitable receptacles." The machine " may be applied to clear the rails of railways from dirt and snow " by attaching it in front of the railway tender or engine."

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 21.]

A.D. 1844, October 22.—N° 10,358.

NASMYTH, James, and MAY, Charles.—" Improvements " in working atmospheric railways, and in machinery for con" structing the apparatus employed therein." "The invention " relates to the means of obtaining the requisite vacuum in the " traction pipe of atmospheric railways," whereby " a greater " extent of vacuum can be instantaneously obtained, ... and " a certainty of more quickly closing the valve, so as to prevent " leakage consequent on any want of power of the outer atmo" sphere, owing to the partial state of vacuum in the traction " pipe."

[Printed, 10*d.* Drawing. See Repertory of Arts, vol. 5 (*enlarged series*), p. 345; Mechanics' Magazine, vol. 42, p. 480; and vol. 43, p. 186; Engineers' and Architects' Journal, vol. 8, p. 169.]

A.D. 1844, November 9.—N° 10,387.

PROSSER, William, junior.—" Improvements in the construc" tion of roads, and in carriages to run thereon."

The inventor claims the construction of tramways of wood when combined with guide rails. He describes a tramway of wood fitted with a central guide rail upon which latter runs a flanged guide wheel attached to the locomotive or carriage. The wheels which run on the trams have no flanges. He also describes a tramway in which there is no central rail, but inclined guide wheels are placed to run against the inside of the trams. He prefers the grain of the wood to be other than horizontally placed.

[Printed, 10*d.* Drawing. See Engineers' and Architects' Journal, vol. 8, p. 171.]

A.D. 1844, December 18.—N° 10,443.

PROSSER, WILLIAM, junior, and CARCANO, JEAN BAPTISTE. —(*A communication.*)—"Improvements in working atmospheric " railways." The invention consists in "so arranging the " valves used for closing the longitudinal openings or slits in " the traction pipes that they shall open inwards, combined " with the use of suitable transverse valves or slides at proper " intervals in the traction pipes for the air to press against " when moving the pistons." Also in "the application of reservoirs " for receiving air in a compressed state to such traction " pipes;" and also in "causing the air which has been used . . . . " to be returned back into reservoirs to be again used."

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 6 (*enlarged series*), p. 81; Mechanics' Magazine, vol. 43, p. 105; Practical Mechanics' Journal, vol. 1, p. 157; Artizan, vol. 4, p. 3; and vol. 6, p. 191; Engineers' and Architects' Journal, vol. 8, p. 226.]

A.D. 1845, January 11.—N° 10,457.

GRIFFITHS, ROBERT.—"Improvements in the manufacture of " bolts, railway pins, spikes, and rivets." The patentee claims " the raising or forming of heads on pin bolts, rivets, &c. by " means of a reciprocating beam or lever, without having a bolt " or other guides for fixing the tools." Also "having two hammers " and two sets of tools, so that the workman will be able to " part, make his bolts in one set, and finish in the other, whereby " he will be able to finish his bolts, &c. at one heat."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1845, January 14.—N° 10,467.

LACY, HENRY CHARLES, and BUCK, GEORGE WATSON.— " A new manufacture for and method of sustaining the rails of " railways." "The invention consists in adapting and applying " plate, or sheet, malleable, or wrought iron," bent to a certain angle, "to the purpose of sustaining the rails of railways, either " in whole length cross sleepers in lieu of the present wooden " sleepers, or by short or half sleepers, answering for the stone " blocks," and in fastening the chairs by means of pins placed in holes punched through the chair, sleeper, and wood block placed between the chair and the new sleeper.

[Printed, 8*d.* Drawing. See Repertory of Arts, vol. 6 (*enlarged series*), p. 99; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 394; Engineers' and Architects' Journal, vol. 8, p. 266.]

A.D. 1845, January 16.—Nº 10,471.

DUBERN, Henry Adolphe.—(*A communication.*)—" Improve-" ments in atmospheric railways." This invention is for " an " improved mode of constructing the longitudinal valve of the " propelling tube of atmospheric railways." It is closed " by two " plates of steel or springs. These are bent in form of segments " of a circle, and are placed with their convex sides towards each " other, and meet at their upper ends, the parts which are in " contact being very small," and " are fixed upon the propelling " tube, a concave bed or seat " being made " to receive " them. " The springs project a distance of an inch and a half or two " inches only above the longitudinal opening, and they are " fastened to the tube at their lower extremities by means of " screws and iron bars, which press equally upon them throughout " their lengths; . . . . a space to be filled with soft grease is " formed along the upper side of the tube, and rises about a " quarter of an inch above the metal plates or springs on each " side of them, so as perfectly to enclose them."

[Printed, 8*d.* Drawings.]

A.D. 1845, March 13.—Nº 10,556.

DUNN, Thomas.—" Certain improvements in or applicable to " turntables, to be used on or in connection with railways." The invention consists, " first, in the application to such railway " turntables only as have their platforms at all times supported " in a greater or less degree on friction rollers of such appa-" ratus " as cams, or wedges, or screws as " will, by being placed " in contact with the platform, give support and stability to it " where one or more of the friction rollers may have become " lower than the level of the rest, leaving the other parts of the " platform to be supported by the friction rollers, so that when " a carriage passes over the table, the platform is prevented from " shaking; . . . . and when it is required to turn such platform " the apparatus is changed in its position, so as to allow the " platform to be turned on the rollers. Secondly, in constructing " the curb or stationary casing of the platform of a turntable, " and also the platform itself, which has to work in it in the form " of a ring, which form admits of a portion of the permanent line " of railway being left within the curb and platform, whereby the " carriages of a train are less liable to run off the line in case the

" rails on the platform are not left in a line with the permanent " rails on each side, and within the table, and by the platform " being so short in its bearings it is enabled to sustain a greater " weight than ordinary platforms are without being otherwise " damaged. Thirdly, in constructing the general surface of the " platform of a turntable of metal on a level with the tops of the " permanent rails, and in forming grooves in the platform for the " flanges of the wheels to pass into; so that if the grooves in the " platform should not be in a position to receive the flanges of " the carriage wheels as they pass from the permanent rails, such " wheels will have to mount on the surface of the table the height " of the wheel flanges only, and not the height of a rail, which is " the case in turntables as at present constructed. And, lastly, " in the application of a guide ring or wheel placed on the surface " of the platform of a turntable, and in guide rings or wheels " placed near to a turntable within or outside of the rails of a line " of railway, in such positions that if the wheels of a carriage " have only got a short distance off the rails by the platform " not being in the position it ought to be for a train to pass " over it, such rings or wheels will guide them on to the rails " again."

The inventor subsequently disclaimed parts of his invention, and added a memorandum of alteration by which his improvements were limited in application to such turntables only as " are " placed within a curb."

[Printed, 2*s.* 4*d.* Drawings. See Artizan, vol. 6, p. 110 (*with Disclaimer*).]

A.D. 1845, April 14.—N° 10,609.

HADDAN, John Coope.—"Improvements in preparing sleepers, " chairs, and spikes, and constructing wheels for railways." " The improved railway sleepers consist of pieces of wood of the " ordinary description and dimensions used for tranverse railway " sleepers, but cut and prepared for the reception of chairs, and " of rails without chairs in an improved manner;" thus, two spaces are made by cutting away portions of the round or convex sides of the wood for the reception of two chairs, in such manner that the seats for the chairs may have shoulders, may be level and in the same plane, and sufficiently large to receive the chairs intended to be used, and must be placed at a proper distance apart, according to the gauge of the railway for which the sleeper is intended. "The improvement in the construction of railway

" chairs consists in making one end of such chairs perpendicular
" to the base, and of larger dimensions than heretofore, for the
" purpose of their being more firmly held in their proper positions
" by the outer shoulders of the seats of the improved sleepers, and
" in making such chairs with holes for spikes or other fastenings." The holes are made oblong, so that the fastenings may
" be freed from all the lateral pressure outwards which the
" passing of the railway carriages has a tendency to produce,
" the chair being maintained in its proper position by the outer
" shoulder of the seat or space in which it is placed; but if the
" chair is intended to be fastened with the improved spikes, the
" holes must, in addition to being made oblong, also be made
" countersunk."

The patentee further claims "the preparation of iron railway
" spikes or fastenings with countersunk heads and enlarged
" points or ends," and "the preparation of wooden spikes with
" the ends or points larger than the part next the head."

[Printed, 2s. Drawings.]

A.D. 1845, April 29.—N° 10,643.

NASMYTH, JAMES.—"Certain improvements in engines or
" machines for obtaining and applying motive power."

The invention has reference to atmospheric railways.

In a section of railway, say three miles in extent, a tube one mile in length is placed in the middle. This is fitted with a piston the rod of which wouid be two miles long, one mile on each side of the piston. Suitable contrivances are provided for supporting the rod, and the tube is closed by valve doors at each end. A rope or rod is attached to the ends of the piston rod by means of arms, and this rope or rod consequently runs parallel with and above the tube. It is to this rope that the train is attached. To start with, the train is hooked to the rope at the end of the piston rod at a station one mile from the nearest mouth of the tube. The piston then travels the length of the tube, which brings the train to the tube. Then the train is unhooked and the piston sent back. A second time the train is attached, but this time to the centre of the rope and over the piston. Another journey of the piston takes the train to the other end of the tube, where the process of unhooking and sending back the piston is repeated. This time the train is attached to the farthest end of the rod and so it is pushed to the last station, that is one mile beyond the tube end.

Motive power for working the pumps, &c., is obtained by the friction of the piston rod on the periphery of a wheel.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 79.]

A.D. 1845, May 10.—N° 10,662.

PROSSER, William, the younger, and BRETT, Jacob.—" Improvements in railways, and in propelling railway carriages." The patentees claim " a peculiar formation of the valves as applied " to air locomotives, videlicet, two strips of soft elastic leather " abutting against each other, either by the combined action of " longitudinal springs and the atmospheric pressure, or simply by " the external pressure of the air, and supported on a perforated " bridge. The substitution of a series of apertures for a continuous " slit or chase, by which means collapsion is prevented even with " very thin metal. Two valves on one pipe, ... thus making " one pipe answer for a double line of rails; the expansive action " of air in the locomotive cylinders " causing them to force air into a reservoir on the carriage or locomotive, thus making the compressed air act as a break, and subsequently as an independent source of power to start the train by working the cylinders; " attaching the slide pipe to the locomotive by means of flexible " tubes prepared so as to prevent collapsion, and by connecting " rods, &c., having a certain degree of elasticity," working the valves when the main is depressed below the road level; the arranging of vacuum reservoirs along the line at intervals; and coating the main with non-conducting substances to prevent the absorption of heat by the rarified air.

[Printed, 1*s*. 10*d*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 1; Engineers' and Architects' Journal, vol. 8, p. 385.]

A.D. 1845, May 10.—N° 10,663.

CHAPMAN, John Mellar.—" Improvements in the manufac" ture of rails and other parts of railways."

[No Specification enrolled.]

A.D. 1845, May 17.—N° 10,671.

MAC DOUGALL, Alexander.—" Certain improvements in the " method of working atmospheric railways." " The motion of the

" piston is transmitted to the carriage " thus :. . . . There is " a " traction pipe or tube, furnished on the top side with a longi- " tudinal opening of a trough shape, proportioned to the size of " the pipe. The trough is furnished with a pliable substance " which covers the longitudinal opening of the tube," and is attached to flanches. " The substances suitable for the pliable " covering are leather, caoutchouc, vulcanized caoutchouc, macin- " tosh cloth, oiled cloth, or others which are impervious to air, " and combine pliability with tenacity and durability."

The piston is followed by a kind of carriage which runs inside the traction pipe and is attached to the piston. This carriage supports a wheel, the periphery of which raises the flexible covering of the valve and causes a protrusion. Thus the said wheel is enabled to engage with another wheel, or pulley, or friction roller carried on the framing of the carriage in the train, consequently as the piston travels, the wheel of the piston, continuously raising the valve, travels also and pushes the train before it.

The inventor also proposes to cover the longitudinal opening with "a flexible metallic plate," and the carriage may be propelled by the engagement of an arm attached to the piston with a corresponding arm on the carriage.

The inventor also describes " a new method of effecting the " production of the requisite vacuum by means of a fan " and claims the use of compressed air behind the piston when used in conjunction with the vacuum before it.

[Printed, 1*s.* 8*d.* Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 129.]

A.D. 1845, June 3.—N° 10,706.

LAWES, THOMAS.—" Improvements in propelling carriages on " rail and other roads, and boats or vessels on canals or rivers, " which improvements are also applicable to machinery in " general."

Lengths of tubes are placed under the railway and at the open end of each the rope attached to the piston passes under and over guide wheels to the train. Such guide wheels are placed also at intervals along the line to support the rope. When the train reaches the limit of one tube, it is detached and transferred to the next tube, and so on. When the line is curved another arrangement is necessary, because the pneumatic tubes must be made straight. In this case a straight length of tube may be placed

" at any convenient angle to the line of railway" and the traction rope passed to the train by the help of guide wheels.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 323.]

A.D. 1845, June 5.—Nº 10,707.

PALMER, WILLIAM.—" Improvements in working atmospheric " railways, and in lubricating railway and other machinery." The patentee claims " the application of tallow-oil, or other fatty " matters or oils prepared in the form of soap insoluble in water " by means of litharge or other metalline matters to line the interior surfaces of the traction pipes of atmospheric railways."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 114; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 428; Engineers' and Architects' Journal, vol. 9, p. 92.]

A.D. 1845, June 23.—Nº 10,731.

CLARKE, THOMAS, and VARLEY, JOHN.—" An improvement " on the atmospheric system of propulsion, which is also applicable to other motive purposes." " Instead of employing a " rigid traction tube, and a series of short flaps to cover the longitudinal slit or valve in the tube, and sealing these flaps with a " mixture of wax and tallow" after every passage of a train, " a " tube" is used, " which is to a certain extent yielding or resilient, " and fitted on the inner or opposite faces of the longitudinal " slit with lip or valve pieces of the same continuous length as the " tube itself, so that the longitudinal slit is closed before and " after each passage of the train by the action of the tube and " lip pieces themselves." Also " as another substitute for the " rigid tube valve or valves a yielding or resilient tube" is used, " made in two parts, which are united by rivets at the bottom " and these parts terminate at top in upright projections of unequal lengths, which on being brought together form a cup-" shaped valve. On their inner faces these projections are " covered with sulphurized caoutchouc, sulphurized gutta percha, " leather, or other flexible substance, and the" cup-shaped valve " is filled to near the top with . . . . a soft substance or com-" position, the melting point of which is above the ordinary " temperature of the atmosphere," which " keeps the valve at all " times equally closed, except when the connecting rod is passing " through." Also " instead of the traction tube being fixed and

" the piston being moveable, as usual, the traction tube may " be movable, and the piston stationary."

The patentee describes other valves constructed on the same principle as the above; also a method of working sidings, a break consisting of segmental pieces forced against the inside of the tube by the pressure of the air against a conical plug, and a method of producing a vacuum by means of water.

[Printed, 5*s*. Drawings. See Mechanics' Magazine, vol. 45, pp. 40 and 108; Artizan, vol. 6, pp. 53, 182, and 214; Engineers and Architects' Journal, vol. 11, p. 341.]

A.D. 1845, June 25.—N° 10,735.

ZAMBAUX, Joseph. — " Improvements in atmospheric rail-" ways," by " employing an additional tube placed along the line " of railway, the air from which tube is exhausted by pumps or " other convenient means; a communication is established be-" tween this tube and the propulsion or traction tube, which " communication is regulated by valves " (connecting the two tubes), " by which arrangement the movement of a train may " be easily controlled in either direction;" also by " arranging " certain valves and apparatus of atmospheric railways; by using " the travelling carriage for opening the valves," and by " a mode " of constructing the longitudinal valve of three pieces of leather " or other similar flexible material stitched together " in the form of a conical section; " it closes hermetically the longitudinal " slit in the tube, that being of a similar form. Between the " pieces of leather are placed wires or other non-elastic material " to prevent them from stretching."

[Printed, 1*s*. Drawing. See Repertory of Arts, vol. 7 (*enlarged series*), p. 257.]

A.D. 1845, June 25.—N° 10,736.

WARD, William Sykes.—" Improvements in exhausting air " from tubes or vessels, for the purpose of working atmospheric " railways, and for other purposes." One of the " improvements " relates to the arranging and working of the valves of air " pumps for the purpose of exhausting the air from the traction " tubes of atmospheric railways," so that " the power required " for opening and shutting the valves is supplied by gearing or " mechanical movements from the engine or other source of " power by which the air pump is actuated, so that the inlet

" valves are opened and shut alternately almost immediately " after the commencement of the stroke of the piston of the " pump, and the outlet valves are respectively closed or pushed " home at the conclusion of the stroke of the piston;" and another of the improvements "consists in the combination of " large vessels or reservoirs with air pumps, so that such vessels, " having been previously exhausted, shall assist the pumps in " the exhaustion of the traction tube."

The patentee also describes a method of packing the pistons.

[Printed, 1*s.* 6*d.* Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 65; Mechanics' Magazine, vol. 44, p. 110; Engineers' and Architects' Journal, vol. 9, p. 91.]

A.D. 1845, July 3.—N° 10,749.

HOPKINS, JOHN.—" Certain improvements in rails and trams " for railways and tramways." The object of the invention is " to apply wood in such a manner as to constitute a rail or tram " or continuous wooden surface on which the peripheries of the " wheels of engines and carriages may travel." The peculiar shapes of the rails are intended to prevent the wheels of the carriages travelling thereon from running off the same. "The " advantages arising from such an application are increased trac- " tional power and greater ease to travellers."

The blocks of wood are fixed in iron frames, and the inventor does not make any claim to the shape of the blocks.

[Printed, 6*d.* Drawing. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 30; Mechanics' Magazine, vol. 44, p. 110; Engineers' and Architects' Journal, vol. 9, p. 92.]

A.D. 1845, July 3.—N° 10,753.

NEWTON, WILLIAM.—(*A communication.*)—" Certain improve- " ments in railways, and in the means of propelling carriages."

The first part of the invention is descriptive of a locomotive to run on a railway fitted with a central rail. This central rail may, "if thought preferable, be constructed of wood properly " prepared; it is furnished with flanges, which will prevent the " engine from getting off the travelling rails." The engine is provided with a horizontal wheel, upon the axis of which " is " mounted a roller or rollers which acts or bears" against the central rail. The horizontal wheel is furnished with fans, upon which a jet of steam or compressed air impinges, and thus supplies the motive power.

"The second part of the invention relates to various improve-" ments in atmospheric propulsion, by which the power that is " exerted to propel the carriages is obtained either by means of " compressed air acting upon a piston in a tube, or in a cylinder, " in the same way as steam is now employed, or by creating a " partial vacuum in the traction tube of ordinary atmospheric " railways. The improvements consist principally in various " novel and simple modes of closing the longitudinal valve, . . . " and in connecting the piston inside the tube with the carriages " outside, and also in certain novel plans of regulating the escape " of compressed air from the long tube into the cylinders of the " engine which is intended to be worked by compressed air " instead of steam."

The patentee also describes a method of atmospheric propulsion without the use of "an open valve or groove;" and also a " method of communicating the action of the piston to the car-" riages without any direct and positive connection between the " two" by means of magnetic attraction.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1845, July 21.—N° 10,779.

BRETT, Jacob.—(*A communication.*)—" Improvements in atmo-" spheric propulsion, and in the manufacture of tubes for atmo-" spheric railways and other purposes." " In this apparatus the " locomotive force is produced by fixed engines . . . . serving " to compress air or to produce a vacuum in a main or tube " placed in or upon the ground the whole length of the road or " way. From this immense main or reservoir the force is sup-" plied to great distances, to be applied, when requisite, for the " transport of trains of carriages, &c."

At intervals along the main, or attached to branches from it, are arranged stationary hollow pistons, each fitted with a suitable valve. Under the locomotive is a horizontal tube, accurately fitted to take the piston and open at each end, but fitted with valves. The locomotive as it advances reaches one of the fixed pistons, which enters the tube. As it does so, the valve is opened by a lever attached to the locomotive, and the compressed air rushes into the tube and acts as a motive power. Thus the inventor claims "the working atmospheric railways with stationary " pistons and a travelling atmospheric tube."

He also manufactures the pneumatic tubes of sheet iron and " bitumen, united by joints with screws."

[Printed, 6s. 6d. Drawings.]

A.D. 1845, July 31.—N° 10,794.

QUICK, Joseph, and AUSTIN, Henry.—" Improvements in " the construction and working of atmospheric railways." One part of the invention consists " in the method of obtaining a close " joint or valve at the opening of the tube necessary for the passage of the arm connecting the carriage and the piston. To " effect this, advantage " is taken " of the pressure of the external " air upon the surface of the tube to force into close contact the " two sides or meeting surfaces of the valve, so as to make them " air-tight. The tubes are formed of two or more segments or " parts of sufficiently thick material of suitable kind as to be " rigid of themselves, and unaffected under the external pressure of the atmosphere, but joined to each other with an elastic " or pliant material, or bolted together," or the tube may be made flat at the bottom and have curved sides or otherwise. " After the tube has been opened . . . . to allow of the passage " of the connecting arm, the weight of the segments of tube " will cause them . . . . to close the valve, and the pressure of " the atmosphere upon the external surface of the segments or " portions of tube when the vacuum is formed within, will force " the sides closely together."

The valve is provided with grease contained in bags of cloth or canvas.

Another part of the invention consists " in the method of " working several separated lengths or sections of tubes on " atmospheric lines simultaneously by the same engine establishment, or whereby trains or carriages may be simultaneously " propelled to and from any desirable number of intermediate " points or stations between two engine establishments." A closed trunk lies parallel to the working trunk, and into which the latter exhausts at intervals through connecting valves. The two trunks may also be combined in one for the same purpose.

A form of piston suitable "for travelling in both directions, " without the necessity of turning," is also described.

[Printed, 1s. 2d. Drawings.]

A.D. 1845, August 7.—N° 10,809.

EMANUEL, HENRY. — " Improvements in atmospheric rail-" ways."

The invention comprises an arrangement " of the propelling " tube, and a method of closing the longitudinal valves, by a " flexible tube filled with compressed air, the pressure of which " is exercised on this valve in the same direction as the pressure " of the atmosphere when exhaustion is produced in the tube, so " that the continuous opening is closed by a resisent body, con-" tinually kept and returned to its place, and on which the " exhaustion has no other effect than to close it better." It further comprises improvements in the piston and other parts; and also a method of exhausting by means of cylinders, immersed in water, like gasometers.

[Printed, 10*d.* Drawing. See Repertory of Arts, vol. 8 (*enlarged series*), p. 135; Patent Journal, vol. 1, p. 155; Macrory's Reports, p. 232 (*Disclaimer*).]

A.D. 1845, October 6.—N° 10,851.

POOLE, MOSES.—(*A communication.*)—" Improvements in rails " for railways."

The invention consists in so constructing the rails that " the " wheels of the locomotive engines may run on wood, and the " wheels of the carriages on metal," whereby more adhesion is given to the wheels of the locomotive than to those of the carriage. " The metal rails are fixed by screws or other convenient " means to the top inner angles of the wooden rails," and if guide wheels are used in place of flanches to the wheel " for guid-" ing the locomotives or carriages on their rails, such guide " wheels may come in contact with the metal rails."

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 7 (*enlarged series*), p. 270; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 240; Engineers' and Architects' Journal, vol. 9, p. 185.]

A.D. 1845, October 6.—N° 10,854.

CRAMPTON, THOMAS RUSSELL.—" Improvements in locomo-" tive engines and railways." One improvement consists " in " placing a wooden rail outside of" and somewhat higher than the " ordinary iron rails on railways, on which wooden rail the " driving wheel of the locomotive is intended to run at the same " time the other wheels revolve on the iron rail. By this arrange-

" ment the great adhesive qualities of wood are insured, while the " disadvantages arising from the increased traction, resulting " from the whole of the wheels moving upon wood, is obviated."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 8 (*enlarged series*), p. 17; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 241; Engineers' and Architects' Journal, , vol. 9, p. 220.]

A.D. 1845, October 10.—N° 10,873.

HARLOW, FREDERICK.—" Improvements in atmospheric rail- " ways." The invention consists of improvements in constructing and applying the longitudinal valves, and pistons of atmospheric railways. " The peculiarity of the valve is that it is a " sliding valve made up of pieces so connected as to be air-tight " at the junctions, and yet allow of movement to the separate " parts, in order " to allow " of the passage of the " connecting bar. The improvements in the piston are in so arranging the valves in it " that it may be used first in one direction and then " in the other."

[Printed, 1*s*. 4*d*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 321; Artizan, vol. 6, p. 148.]

A.D. 1845, October 16.—N° 10,882.

REED, STEPHEN.—" Certain improvements in railway rails and " chairs." The invention consists in constructing railway chairs and rails, " by casting the said chair and rail together, and of one " and the same entire piece of metal, or by casting the chair sepa- " rately," whereby it affords an extended bearing surface and sup- " port to the rail, and the rails thus laid are less liable to bend, " break, or spring up at the ends thereof, or to open or be drawn " asunder at their ends." Also in " the application of a projecting " piece or pin affixed to and underneath the said rails, and near " the ends thereof," and being inserted into " square or oblong " holes formed in the base or footings of the said chairs." Also in " connecting the several lengths of rails by notching the rails at " their ends vertically from the upper surface thereof to the bottom, " which mode of securing the rails . . . . is intended to prevent " their separating or springing up, as also lateral movement of the " rails more than is necessary for the due expansion and contrac- " tion of the metal." Also a method " for effecting the necessary " adjustment of two lines of rails to the required gauge or distance . . . . asunder, and by which they are securely retained in

“ that position.” Also “ the supporting and connecting together “ of rails in single or double lines by constructing two chairs of “ one and the same entire piece of metal.”

[Printed, 1*s*. 4*d*. Drawings. See Artizan, vol. 10, p. 170.]

A.D. 1845, October 23.—N° 10,890.

ORSI, Joseph.—“ Improvements in sleepers and blocks for supporting rails of railways.” The invention consists “ in constructing the sleepers of bars or rods of metal, which are passed “ through the under part of the railway chairs, and are imbedded “ in cement, so as to form blocks having broad surfaces at bottom, “ and also a peculiar construction of chair for embracing or holding the bars or rods. In imbedding in cement blocks of wood “ braced by transverse tension rods, so as to form sleepers upon “ which ordinary chairs for railways may be fixed by bolts, screws, “ or nails. In fixing chairs for railways in blocks of cement to “ form sleepers, by imbedding projections or wings at the lower “ parts of such chairs in the plastic material and connecting two “ such blocks or sleepers together by transverse rods attached to “ the metal chairs. And in constructing longitudinal sleepers for “ railways by means of stout planks of wood combined with “ iron bars or rods placed side by side, and imbedded in cement “ so as to form a continuous block, upon which the rails of railways may be fastened down without employing chairs.”

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 389; *with Memorandum of Alteration.*]

A.D. 1845, October 31.—N° 10,901.

BRANDLING, Robert William.—“ Improvements in railways “ and railway carriages for the security and convenience of the “ public.” The invention consists “ in a mode of keeping the “ wheels of “ railway carriages constantly upon the rails, by the “ application of counteracting pressures in opposite directions, “ and by means that do not cause any violent shock, in resisting any deviation from that position of the train where the “ weight is equally distributed on the two rails; in constructing a machine by which the railway trains are firmly attached “ to or easily liberated from the rope which draws them; in “ causing the trains to pass upon the surface without any obstruction to the usual traffic along the public highways; in confining the machine and rope below the surface, and in a new

" mode of communicating the tractive power to to ropes used " on railways."

Elevated guide posts are laid outside the other rails and serve to retain the carriages in position, through the half of a rail attached to each side of the carriage and which rail moves under the inverted heads of the guide posts.

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 341; Patent Journal, vol. 1, p. 46; Engineers' and Architects' Journal, vol. 9, p. 186.]

A.D. 1845, October 31.—Nº 10,902.

COLLINS, Charles Henry.—" Improvements in atmospheric " railways." " The main or traction pipe is laid between the rails " in the usual manner, and in place of a continuous longitudinal " valve being made along the top, as is ordinarily the case," it is furnished " with a series of longitudinal slots, ... alternate " equal portions of the pipe being slotted and left whole, ... " and the slotted portions are covered by a box placed bottom " upwards and bolted air-tight to the top of the pipe, such box " terminating at each end both internally and externally in an " incline or slope, which brings it gradually down to the inside " and outside of the pipe respectively. The manner of preventing " ing the passage of the air through the box during the passage " of the piston," is as follows :—" Two pistons are mounted on " the same shaft, one behind the other, a short distance apart. " These single pistons are formed of cup leathers in the usual " way. . . . . Between the two single pistons is a hollow cylin- " der of nearly the diameter of the pipe, and having a slot cut out " of the same throughout its whole length, of the same width as " and immediately below the opening in the box to allow a spring " to pass up . . . . into the box for the purpose of closing it. On " either side of the slot so cut out of the cylinder, a slip of leather, " which reaches from one cup leather to the other, is rivetted, and " prevents the passage of any air between the side of the cylinder " and the traction pipe and the spring, by rising up and bearing " against the upper side of this box prevents the air from passing " through the box to the front of the piston," the patentee also claims the " use of forks, Ys, pins, studs, grips, pincers, or other " equivalent parts attached to or connected with the piston and " carriage, and causing the same to lay hold of a driving rod, or " take into notches or holes, or on to studs or projections formed

“ in or on the same, for the purpose of establishing a connection
“ between the piston inside the tube and the carriage outside.”

[Printed, 1*s*. 8*d*. Drawings. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 1; Patent Journal, vol. 1, p. 147.]

A.D. 1845, October 31.—N° 10,905.

FORSYTH, Thomas.—“ Certain improvements in signals, or in
“ the method of giving signals, which are applicable to the working
“ on railways, and which are also applicable to maritime purposes,
“ and for certain other improvements in the working of
“ railways.” The patentee claims “ the giving and receiving of
“ signals made by numbers of lights, arranged so as to be the
“ same in figure and number upon the train to be signalled to,
“ and upon the station signal apparatus,” and all the engine
drivers “ require to know regarding signals is, what number and
“ figure of lights is their own engine carrying, and that when they
“ see a similar number and figure of lights they are to understand
“ thereby that their train is desired to stop at the station where
“ the similar signal is given from.” Also a “ portable crossing,”
“ one variety of which is made by fastening two strong flat ropes
“ on to a piece of broad cloth, so as to become when laid upon
“ the ground a temporary rope tramway, over which a train may
“ pass from one permanent line of rails to the other; . . . .
“ another variety may be made of chain laid upon timber, or in
“ different methods, which will suggest themselves to persons
“ conversant with railway working.”

[Printed, 2*s*. 10*d*. Drawings.]

A.D. 1845, November 11.—N° 10,932.

DONKIN, Bryan. — “ Certain improvements on wheels as
“ applicable to railway carriages, and on the mechanical contrivances
“ by which railway carriages are made to cross from one
“ line of rails on to another line, or on to what are generally
“ called sidings.” The invention consists “ in providing the
“ foremost carriage of each train with suitable parts, which,
“ whilst that carriage is moving alone one main line of rails, can
“ at pleasure be set or let down into such a position on the said
“ carriage, as that some of the said parts will afterwards, by continuance
“ of the motion of the carriage, be brought into contact
“ with a suitable long lever, so as to exert a very oblique

" action thereon for moving the same laterally, in order thereby " to move suitable double switches of ordinary construction, with " which it is connected, so that such switch rails . . . . will " become properly set in due time for conducting the carriage" from the main line of rails on to another line or into a siding, and in "giving the requisite motions to double switch rails by " action derived from a weight suspended by a cord or chain that " is kept wound up around a roller, so as to exert a continual " tendency to turn that roller round, and in so doing, by means " of a cam on the axis of the roller, to raise up a loaded lever, " which is connected with the double switch rails in the manner " of a reacting weight thereto . . . . which moves those " rails into correspondence with the rails of the siding." The loaded lever is released by the train to move the switch.

Also in a crossing wherein the crossing rails have their centres of motion "at or near the middle" of their length. Crossing rails are also made broader at their tops, and an arrangement of double guard rails is described.

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1845, November 18.—N° 10,948.

POOLE, Moses. — (*A communication.*) — "Improvements in " raising and transporting earth and other heavy bodies."

The inventor raises the carts or wagons from the bottom of a cutting or excavation, by means of an endless chain placed between the trams.

When working on "loose, new, or newly-formed ground" he uses a railway of the following description:—It is "formed of " pieces of wood; one end of these pieces is formed concave and " the other convex, in order that the one may fit into the " other." The horns of the concave end are pinned down to iron plates, "and there is a small iron peg in the centre upon " which the rail turns." The position of the railroad may be varied without taking up the whole of the rails. "The pieces of " wood on which the wheels of the wagon run are to be covered " with an iron plate over their width, and a small part of their " thickness."

[Printed, 10*d*. Drawing. See Engineers' and Architects' Journal, vol. 9 p. 219.]

A.D. 1845, November 18.—Nº 10,949.

WARD, Frederick Oldfield, and HILLES, Malcolm William.—"Improvements in the construction of railways, "and in machinery and apparatus for working carriages there"on." The invention consists in "a mode of arranging "machinery or apparatus for working railways by means of "steam caused to act on a piston moving in a tube fixed along "the length of the railway, the steam employed being generated "in a boiler carriage moving along the railway;" and also in "a "mode of making rails for railways, by combining wrought and "cast iron." The bar is of wrought iron, and the cast metal is poured to it to form the chair or means of fixing.

[Printed, 2s. 8d. Drawings.]

A.D. 1845, November 18.—Nº 10,954.

WILSON, Edward Brown.—(*A communication.*)—"Improved "apparatus applicable to swivel bridges and turntables."

[No Specification enrolled.]

A.D. 1845, December 6.—Nº 10,982.

JOHNSON, John Robert.—"Improvements in the materials employed in constructing and working atmospheric railways." The invention consists "in a new composition for sealing the "valve and closing the joints of the traction tubes of certain, "descriptions of atmospheric railways," viz., "palm oil, one "part; brown resin, two parts; and china clay in fine powder "four parts;" or a mixture in various proportions of the insoluble soaps, prepared by combining fats with an oxide or earth with oily or resinous substances, and "in a new material for "lining or lubricating the interior of the traction tubes of atmo"spheric railways," for instance "resin, seven parts; stearine, four "parts; tallow, four parts; clay, 12 parts;" and also "in an "economical substitute for the leather used for the longitudinal "valve of atmospheric railways." For this purpose a fabric is "woven or felted in the form of a belt or strap, of the proper "breadth and thickness to form the valve," and made impervious "to air and moisture, and in other respects fit for its "purpose by impregnating its fibres with and cementing them "together by a varnish, of such a nature that when dried it shall "be unacted upon by oil or fats, and possess sufficient elasticity "to bear the bend or flexure to which it is subjected in use;"

and also in "constructing the traction and connecting pipes" of atmospheric railways of "calcareous cements, such as Roman "cement, Keene's cement, and the like, which possess such pro- "perties as allow them to be cast into form and do not require "burning. The cement is mixed or 'guaged' with sand or fine "gravel and water," and rammed into moulds of proper form "for the pipes, as in forming columns and other articles."

[Printed, 10*d.* Drawing. See Repertory of Arts, vol. 8 (*enlarged series*), p. 208; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 394; Patent Journal, vol. 1. p. 99; Engineers' and Architects' Journal, vol. 9, p. 247.]

A.D. 1846, January 3.—N° 11,024.

SWINBURNE, THOMAS.—"Improvements in railways, and in "the means of propelling and carrying thereon." The patentee claims "the employment in atmospheric railways of short and "discontinuous traction or propelling tubes placed at intervals "more or less apart. The application of the propulsive power ob- "tained by the exhaustion of such short tubes to the propelling "of carriages. A means of packing the pistons of atmospheric "railway tubes" and a mode of obtaining and of preserving "the vacuum when once obtained in such short tube;" and also a method of "working the pistons by hydraulic pressure."

[Printed, 10*d.* Drawing. See Mechanics' Magazine, vol. 45, p. 193; Patent Journal, vol. 1, p. 292.]

A.D. 1846, January 6.—N° 11,026.

GREENHOW, CONRAD HAVERKAM.—"Improvements in the "construction of railways and railway carriages." The inventor makes use of "a convex rail and a peculiar formation of a concave "wheel tyre, combined with inclined spokes, whereby in the event "of one rail sinking below the level of the other, the tyre of the "sunken wheel will bear on the rail with an increased diameter, "so as to compensate in surface motion for the depression, and "from the peculiar concave shape the wheel and the rail will "maintain a correct adjustment in respect to each other."

[Printed, 1*s.* 4*d.* Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 73; Patent Journal, vol. 1, p. 146; Engineers' and Architects' Journal, vol. 9, p. 285.]

A.D. 1846, January 22.—N° 11,056.

***WHEELER,* CHARLES.**—"Certain improvements in the con- "*struction and* working of railways." The invention consist in a rail with "three edges or surfaces, capable of being used as " bearing surfaces for the wheels of carriages to run upon, each of " which surfaces may be placed upwards in succession as those " previously in use become worn or injured; . . . . a cast- " iron holding bracket is bolted to the sleeper, a piece of felt or " other material being interposed between the sleeper and the " rail; or the bracket may be formed with a recess on the under " side in which a wedge may be inserted. A mode of construct- " ing and working railways by means of a piston, acted upon by " atmospheric pressure, and traversing in a main pipe having no " communication with the atmospheric air, except at its extreme " end behind the piston." The piston carries a wheel which raises the valve, and protusion thus formed presses against another wheel on an arm attached to the carriage, and propels it. Attached to the carriage also is another wheel, which presses on the valve and keeps it closed. Also in a " horizontal sliding " valve in combination with a wedge-shaped carriage, by which " it is opened, and the springs for closing the same."

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 45, pp. 185, 275, and 372; Patent Journal, vol. 1, p. 183; Engineers and Architects' Journal, vol. 9, p. 252.]

A.D. 1846, January 31.—N° 11,068.

ETIENNE, André.—" Improvements in the construction of " railways, railway carriages, and in the means of preventing " accidents on railways." " To avoid the unevenness of the " joints of the rails, and to render them more solid and firm, and " particularly to prevent their lateral movement, the two ex- " tremities of two rails " are formed " in the shape of a hook, in " such a manner as " that they may be joined by a bolt, so as not to make any " hole through the main part of the rail. An " iron rod or bar " is laid across the line " from one rail to the " other," with a fork at each end in such " manner that the ex- " tremities of the four branches of the forks may be connected by " each end, two by two, to the two extremities of the two rails, " each entering into the hook made to the end of the rail, and " being held by the same bolt which fastens the two hooks of " the extremities of the rails." Also " another improvement in " railways, which consists in using a single rail only." The rails are of different shapes, and may be constructed of wood plated with iron.

[*Printed, 2s. 2d. Drawings.* See Patent Journal, vol. 1, p. 214.]

A.D. 1846, January 31.—N° 11,069.

PILBROW, JAMES.—" Certain improvements in propelling on " land and water." The propulsion is effected by two racks formed in such manner that they shall lay hold of each other, so that the one being forced onward the other must go with it. The atmospheric tube is made "with a square channel along its upper " side, but at every twenty or thirty feet, or thereabouts, the top " part of the channel is cut away for about three feet, and partially filled up on on each side by metal, leaving the space or " slit still preserved. Over this opening flap or cover" is placed, made " of metal, of a curved form, corresponding with that of " the raised part which works upon hinges, and forms a valve to " exclude the atmosphere when shut down. The piston rack is " formed of a triple series of flat metal links, rivetted together " in the manner of a watch chain, ... so that the linked part " shall present a series of holes or interstices for the reception of " a set of teeth or cogs attached to the rack or coulter of the " carriage." The piston rack engages with the coulter at each of the valve openings.

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 45, p. 169; and vol. 48, p. 213; Patent Journal, vol. 1, pp. 68 and 194; and vol. 4, pp. 237 and 356; Artizan, vol. 4, p. 3.]

A.D. 1846, February 11.—N° 11,077.

CLARKE, THOMAS, FREEMAN, MARK, and VARLEY, JOHN. —"Certain improvements in obtaining and applying motive " power, parts of which are applicable to the regulating and controlling of fluids." The invention consists "in an improved " method of securing and supporting the traction tube in " atmospheric railways of the sort known as 'the resilient.' " Standards" are "placed about six feet apart, which consist of " curved arms bolted at the top to the back of the valve pieces " of the tube, and secured at the bottom to a cast-iron saddle. " One of the arms is curved to about a quarter of the circumference of the tube, and then bolted firmly to the cast-iron " saddle, the other arm is curved half round the tube, and " vibrates on a strong pin fixed in the cast-iron saddle immediately " under the centre of the tube. The former arm being rigid, " admits of hardly any play of the tube on the side to which it " is attached, but the latter arm opens and shuts the other half " of the tube according as it is itself acted upon by a . . . .

horizontal lever, which supports at its outer end a longitudinal rail, which runs continuously alongside the main traction tube," which rail, "being depressed by a wheel attached to the carriage train, and the vibrating half of the traction tube" is pulled back, "to allow the connecting rod to pass through between the valve pieces. As soon as the wheel has passed, and the rail is released from the insistent pressure upon it, the levers and rods, and the resilient arms are also released, and the half of the tube to which they are attached springs back to its assigned position and closes the tube." Also in an "improved description of piston. A circular recess is formed in the piston behind the segments, and into this recess a tube made of india-rubber, gutta percha, or some other waterproof substance" is introduced, and is kept "filled with water under pressure by means of a small vessel behind the piston containing compressed air, and having a direct communication with the tubular packing." The piston is so contrived that the vacuum may at any time be destroyed, by a change in the position of the piston.

Also in "the employment in atmospheric railways of thin wrought-iron traction tubes with stiffening and supporting ribs of cast iron" and the "regulating of the slide valves of such tubes by the flow of liquids."

Also in keeping the sealing composition from softening by means of cold water or by mixing with it threads of yarn.

Also in making the air pump of cement or artificial stone and in cooling the air in the pumps.

Also in the mode of opening the longitudinal slit in the traction tubes by means of a wheel running between the two lips of the tube, or by taking off the "pressure on the valve seat by means of side rods," and thereby putting the valve into a condition of being opened by the application of a slight force.

Also in the mode of "accelerating the entrance of the air through the open part of the longitudinal valve of a traction tube behind the piston, whereby the resistance of the external air to the progress of the train is made to drive a blower."

Also in various methods of creating the vacuum, and in the "combined application of the motive power of a pneumatic railway to the conveyance and delivery of gas for economical purposes, and to the maintaining of the locomotive traffic."

[Printed, *7s. 6d.* Drawings. See Mechanics' Magazine, vol. 45, pp. 217 and 252; *Artisan, vol. 6, p. 214;* Engineers' and Architects Journal, vol. 10, *p. 91.]*

A.D. 1846, February 19.—Nº 11,099.

NISBET, Robert. — "Certain improvements in locomotive " engines and railways." The invention consists in making such additions to locomotive " engines and railways that an engine " may be propelled up an inclined plane " without interruption, " and at considerable velocities, or be correspondingly retarded " in its descent down such planes, as follows :—A ring or circle " of strong teeth " is fixed to each or to one only of the sides of " each of the two driving wheels of the locomotive engine," which " teeth are to take into the teeth of racks or rack bars laid " down along the sides of each line of rails wherever there is an " ascending gradient."

[Printed, 10*d*. Drawings. See Mechanics' Magazine, vol. 45, p. 554; Patent Journal, vol. 1, p. 230; Engineers' and Architects' Journal, vol. 9, p. 321.]

A.D. 1846, March 11.—Nº 11,129.

BOVILL, George Hinton, and GRIFFITHS, Robert. — " Improvements in apparatus applicable to the working of atmo- " spheric and other railways, canals, and mines; and improve- " ments in transmitting gas for the purpose of lighting railways " and other places." The invention consists in " using the " pressure of the atmospheric expansively, when employed as a " motive power, in working atmospheric apparatus used in rail- " ways and canals, so as to obviate the loss of power and time " that occurs in exhausting the vacuum tubes before starting the " load, and in drawing or propelling trains on atmospheric or " other railways, and towing or propelling boats on canals by " means of small stationary pneumatic, steam, or hydraulic " engines, or waterwheels placed at convenient distances, and " driving pulleys or traction rollers, which, when set in motion, " acting by their friction upon a long draw bar or compound " draw bar attached to the railway train or canal boat," propel the same.

Also in the "method of transmitting gas for lighting railways, " and other places, by exhaustion or suction " in contradistinction to the system of forcing.

[Printed, 2*s*. Drawings. See Patent Journal, vol. 1, p. 273.]

A.D. 1846, March 11.—Nº 11,134.

AUSTIN, Henry, and QUICK, Joseph.—" Improvements in " the construction of railways, and railway carriages and con-

" veyances;" "and in the laying and arrangement of the rails of " the two gauges, called the broad and narrow guages at the " meetings thereof, and at the crossings, sidings, and turntables " of the two guages, whereby the same railway carriages and " conveyances are enabled to travel both on the broad and narrow " guages, and to pass from one guage to the other without " stoppage, thus obviating and getting rid of the great public in- " convenience of the break of guage so generally complained of."

[Printed, 4d. No Drawings. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 265: Patent Journal, vol. 1, p. 276.]

A.D. 1846, March 25.—N° 11,144.

POPE, Thomas.—(*A communication.*)—" Improvements in appa- " ratus for moving railway carriages on to railways, and in " machinery for lifting and moving heavy bodies," In arranging apparatus which may be "carried conveniently with every train of " carriages, so that should any one of the carriages run off or " become inefficient, such carriage or carriages may be readily " moved on to or off the line as required."

The apparatus in question resembles a screw jack placed on its back. Two short lengths of rail are placed on the screw at a distance apart corresponding with the gauge of the line. When a carriage is to be replaced on the line a pair of its wheels are lifted on to the short lengths of rails by means of a jack; then the screw of the apparatus is worked and the carriage brought over the line. The apparatus is to be applied alternately at each end of the carriage, or two may be used simultaneously. It may be modified to work as a traverser.

[Printed, 9d. Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 272; Patent Journal, vol. 1, p. 405; Engineers' and Architects' Journal, vol. 9, p. 383.]

A.D. 1846, March 25.—N° 11,151.

TAYLER, Joseph Needham.—" Certain improvements in pro- " pelling vessels, and also certain improvements in constructing " vessels so as to be used in combination with certain machinery " or apparatus for removing sand banks and other obstructions " to navigation; part or parts of which machinery or apparatus " may be used on railways, or may be adapted and applied to " carriages on *common roads*." The patentee " claims the " *adaptation and application of* part or parts of such machinery

" or apparatus to carriages, either on railways or common roads, " consisting of the carriage with a double frame and elastic bed " between, consisting also (for railways only) of the heavy luggage " carriage, with a toothed drag, to be brought into connection " with the ground between the rails through the intervention of " an additional central buffer, whether by self-acting means, or " by the agency of the guard, and also the simultaneous dis-" engagement of the carriage."

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1846, April 28.—N° 11,184.

DE BERGUE, Charles.—" Improvements in atmospheric rail-" ways." The invention consists "in constructing and closing " the longitudinal openings in the traction tubes," by means of wheels. In an "arrangement for supporting the piston by means " of a framing and wheels," and in "the application of vulcanized " or other suitably prepared india-rubber in the construction of " valves for the traction tubes of atmospheric railways, in such " manner that the edge or edges of the india-rubber may be " curled or bent against the sides of the longitudinal openings " of such tubes, so as" to close them.

[Printed, 10*d.* Drawings. See Patent Journal, vol. 1, p. 421.]

A.D. 1846, May 5.—N° 11,197.

CHURCH, William.—" Certain improvement in machinery to " be used in making candlestick pans and various other articles, " which are usually produced, wholly or in part, by means of the " process called stamping, and also in machinery for making " sockets or tubes for candlesticks and tubes or tubular articles, " applicable to various other purposes." A machine for flattening and straightening bars and rods of " metal, rails for railways, " &c.," and also a machine for bending strips of flat iron into the form of a tube, suitable for a rail for railway.

[Printed, 4*s.* 6*d.* Drawings. See Patent Journal, vol. 2, p. 717.]

A.D. 1846, May 22.—N° 11,216.

GREAVES, Hugh. — "Improvements in the construction of " railways and in the carriages to be used thereon." The invention consists "in a surface packed sleeper, which is formed of a " *hollow trough,* having an opening at or near its top, through

" which it can be packed or adjusted, so as to raise or depress it " to a line with the sleepers on each side of it. Also, in an " improved chair in connection with a tension rod, to be used at " the joints of the rails, which chair may be cast on the trough " sleeper, and form a part of it, or be separately cast and used " with the tension rod on trough sleepers, or on ordinary sleepers, " whereby the parallelism of the rails forming one roadway " is better retained, and greater strength is imparted to the " roadway."

[Printed, 3s. 6d. Drawings. See Patent Journal, vol. 2, p. 525; Practical Mechanics' Journal, vol. 4, p. 84; Artizan, vol. 9, p. 147.]

A.D. 1846, May 26.—N° 11,222.

COWPER, Edward Alfred.—" Improvements in the manu" facture of railway chairs." The improvements relate to " forming moulds for making railway chairs, such moulds con" sisting partly of sand and partly of metal chill plates, the metal " chill plates being introduced into the patterns before making " moulds (by remaining in the sand), and such chill plates being " allowed to retain their positions in the sand after the patterns " are withdrawn, and until the chairs are formed by the melted " metal."

[Printed, 10d. Drawings. See Repertory of Arts, vol. 9 (*enlarged series*) p. 142; Patent Journal, vol. 2, p. 408.]

A.D. 1846, June 4.—N° 11,237.

ROBERTSON, Joseph Clinton.—(*A communication.*)—" Cer" tain improvements in railways and railway carriages." The invention consists " in arrangements by which the probability of " accidents from the breaking of the axles of the wheels of the " carriages, or from the carriages running off the line, is greatly " diminished." There is placed " in the centre of each line of " railway a centre rail much more elevated than the two side " rails;" and attached to the bottom of each of the carriages" there are " one, two, or more triple sets of rollers, one of which is " placed horizontally so as to come in contact with and run on " the top of the centre rail in the event of an axle breaking, while " the two other rollers are placed vertically one on each side of " the centre rail, to prevent the carriage from swerving to either " side. These rollers *run always* free of the centre rail except

" when an accident occurs, or the making of a sharp curve brings " them into action. The number of sets attached to each carriage " varies with the length of such carriage."

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 46, p. 483; Patent Journal, vol. 2, p. 490.]

A.D. 1846, June 29.—N° 11,274.

PARKIN, Thomas.—" Improvements in the means of giving " motion to railway carriages, with or without bearing wheels " attached to them, and in the construction of ways, passages, and " roads on which the said carriages are to travel." The improvements consist " in the system of locomotion for conveying passen- " gers, goods, and other articles on platforms, with or without " carriages erected thereon, such platforms gliding on the peri- " pheries of friction wheels mounted in parallel lines on metal, " wooden, or other supports; in applying the same system in " part to existing railroads; and in the construction of viaducts " and wooden framework for supports in reference to locomotion, " and in preparing and laying the fonndation on which the same " shall be built or placed."

[Printed, 1*s*. 2*d*. Drawings. See Patent Journal, vol. 2, p. 538.]

A.D. 1846, July 14.—N° 11,295.

BROWN, Sir Samuel.—" Improvements in railways and car- " riages to run on railways, and in the construction and arming " ships or vessels." The improvements comprise " carriages " mounted between two pair of five-feet wheels, plain wheels " without flanges, adapted to run on wood rails. There is a " centre rail with deep centre groove wheels on separate axles. " These centre groove wheels may either be used also as guide " wheels to prevent the bearing wheels from diverging on the " rail, or they may be adjusted to relieve the bearing wheels of a " portion of the weight."

Carriages similarly mounted to run on a " ridge rail which is " conical at the sides but quite flat on the ridge, and two and a " half inches wide and six inches from the ridge to the base."

Forming " floating railways in canal and other inland navi- " gations, by means of a continuous wooden or iron trough " extending the whole length of the canal from lock to lock. . . . . *As these* troughs cannot pass through the locks, the

" railway is raised by an inclined plane of props . . . . to form a " connexion with rails laid down on the embankment of the " locks."

[Printed, 1s. 4d. Drawings.]

A.D. 1846, July 15.—N° 11,298.

PRIDEAUX, Thomas Symes.—" Improvements in machinery " for excavating."

According to this invention the earth is excavated or cut away by revolving cutting instruments, somewhat resembling the buckets of a water wheel, which, as they revolve, empty the earth into buckets carried on an endless belt behind them. This belt in its turn empties the buckets into a wagon placed at the back of the machine. The apparatus is advanced on rails to its work by a worm wheel.

Although the Specification does not state it, this machine is obviously applicable to the construction of railways, and for this reason, the abridgment is inserted in this series.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 9 (*enlarged series*), p. 198; Patent Journal, vol. 2, p. 586; Engineers' and Architects' Journal, vol. 10, p. 121.]

A.D. 1846, July 30.—N° 11,318.

MALLET, Robert, and DAWSON, John Somers.—(*Partly a communication.*)—" Certain improvements in railway carriages " and in machinery for working railways, parts of which are " applicable to other carriages and the bearings of other ma- " chinery." The invention relates amongst other things to " an " improved turn-table for shifting railway engines or carriages " from one line of rails to another. The principal objects aimed " at are, first, to make the principal parts of the table adjustable " independently of the masonry to which it is secured; second, " that the centre of gravity of the whole moveable structure shall " be kept as much as possible below the point of support upon " which it revolves; third, that the table shall be capable of " support at the edge or periphery at any point of its revolution, " and that this support may be promptly applied or withdrawn; " and, fourth, that the friction and resistances to motion shall be " reduced to the utmost possible degree consistent with strength " and rigidity."

The inventors also propose to transfer carriages from one line of rails to another by means of a kind of travelling crane or gantry.

[Printed, 2*s.* 2*d.* Drawings. See Repertory of Arts, vol. 17 (*enlarged series*), p. 1; Mechanics' Magazine, vol. 46, p. 145; and vol. 47, p. 180; Practical Mechanics' Journal, vol. 2, p. 213.]

A.D. 1846, August 11.—N° 11,330.

WARCUP, William.—" Certain improvements in the manu-" facture and arrangement of parts and apparatus for the con-" struction and working of atmospheric railways." The patentee claims the use of "an atmospheric tube, divided longitudinally " into two parts, whether connected by hinges or not, and forming " a complete tube for exhaustion when closed, the longitudinal " connection and joint between the top and bottom parts of the " tube being effected without having recourse to the elasticity of " the material of which the tube is composed, or to the inter-" vention of an elastic material to form a hinge, or otherwise " closing solely by the weight of the upper part without the " assistance of springs or other mechanical agency." He uses " also longitudinal ribs that form the abutment for the top valve " or upper half of pipe."

[Printed, 1*s.* 8*d.* Drawings. See Repertory of Arts, vol. 9 (*enlarged series*), p. 218; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 99; Patent Journal, vol. 2, p. 634; Engineers' and Architects' Journal, vol. 10, p. 90.]

A.D. 1846, August 30.—N° 11,361.

HENSON, Henry.—" Certain improvements in railways and " railway carriages, having for their object the better accommo-" dation and security of the public." The patentee proposes " to facilitate and expedite the transfer of goods and passenger " carriages and trucks from one line of rail on to another of a " narrower or wider guage. A truck with a distance between the " wheels suitable for the ordinary broad guage of seven feet" is used, "two iron rails are fixed upon the upper side of this truck, " the distance between which exactly corresponds with the width " of the rails of the narrow guage. The relative positions of the " two lines of railway at their junction is such that if continued " they would run parallel the one with the other, the narrow " being within the broad; but there is a difference of level equal

" to the height of the surface of the rails on the truck above the " surface of the rails of the line on which the truck is intended " to run, so that when the truck is brought into position " a carriage may, " without any trouble of lifting, be at once run " upon it from the narrow guage line. It is then secured to the " truck." The patentee also claims " an improved form or con- " struction of rails to be used on railways, either made of " malleable iron rolled in the usual manner, or of cast iron " chilled." There is " a cill or longitudinal sleeper which runs " the whole length of the line of rails," and upon this a " triangular " sleeper " of wood is laid and bedded, either upon felt or some other like elastic material. An " angular recess " in the rail " fits " to and rests upon the triangular sleeper," and the rail is secured by bolts to the sleeper. " The heads of these bolts should be " made of some peculiar form which a wrench or key of a cor- " responding form only will open, so that persons only who are " provided with such wrench or key can be able to unscrew " them."

When it desired to increase the adhesion the " upper surface of " these rails " may be " slightly corrugated at right angles to the " direction of their length."

[Printed, 2s. 4d. Drawings. See Mechanics' Magazine, vol. 46, pp. 241 and 350.]

A.D. 1846, October 2.—N° 11,388.

POUILLET, CHARLES MARIE.—" Improvements in railways." Namely, " in the forming a trench the whole length of the lines " of railway, into which concrete or ballast is placed, and in " arranging the sleepers," and " laying them down upon a plate " in such manner as to insure their steadiness and firm position " and to enable them to resist the shocks of the train in passing " over them ;" and in " chairs having interior inclined spaces so " as more readily to give the required inclination to the rails. " By the introduction of these improvements the weight and size " of the sleepers, rails, and chairs may be considerably reduced, " and the upper surface of each part of the rail may be more " easily levelled, and the position of the sleepers more easily " changed when required."

The patentee forms the lower part of his rails of a smaller size, " only giving to that part a sufficient size as to secure its " firmness in the chair."

[Printed, 2s. 2d. Drawings. See Patent Journal, vol. 2, p. 760.]

A.D. 1846, October 8.—N° 11,406.

STRUVÉ, William Price. — " Improvements in railway " transit, and in moving or raising weights." "A carriage or " carriages, waggons, or anything else which may be required to " travel along the railway," is attached to a "travelling piston or " partition" inside the traction tube," and it is evident that the " velocity at which the same will travel will depend upon the size " or area of the piston and the degree of exhaustion created, as " compared with the resistance of the traction and gravitation of " the carriages and piston." The exhaustion is created "by " means of gasometers or hollow chambers moving in water, the " water forming the hermetical seal, the water being contained in " tanks or vessels constructed of masonry, brickwork, or wrought " iron, or any other material, and the chambers or gasometers of " iron plates or other metal, or woodwork, such gasometers to be " enclosed in an outer chamber, so as to form double-acting " pumps, and to be supplied with inlet and outlet valves, the gasometers or hollow chambers being supplied with cranks, connecting rods, shafts, or other machinery to be moved up and " down by means of steam engines or water power, or any other " power or mode most convenient; thus forming large air pumps " the size of the gasometer; air pumps to be governed by the size " of the tube and the velocity" required.

[Printed, 1s. Drawings. See Repertory of Arts, vol. 9 (*enlarged series*), p. 277; Patent Journal, vol. 2, p. 767.]

A.D. 1846, December 14.—N° 11,485.

GALLOWAY, Elijah.—" Improvements in rotary engines and " in locomotive engines, and in railways." The improvement in railways consists " in making the working faces of a middle rail " of steel by having thin layers of steel welded on the surfaces " on which nipping or biting wheels act. This can be done by " piling or uniting thereon bars of steel at a welding heat, or by " some one of the usual methods followed when iron is covered " with steel."

[Printed, 2s. Drawings. See Repertory of Arts vol. 10 (*enlarged series*), p. 272; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 363; Artizan, vol. 7, p. 243; Patent Journal, vol. 3, p. 74.]

A.D. 1846, December 14.—N° 11,490.

TODD, John, and JOHNSTON, William.—" Improvements " in arranging the rails on certain parts of railways. The invention consists in an "improved mode of arranging the rails in the "engine or carriage station houses whereby any one engine and "tender or passenger or goods carriage may be removed from the "station without the necessity of deranging or moving any of the "others placed therein;" and in in a "mode of constructing "switch boxes for railways." The points or switches are connected by means of "a rod and link to a bell-crank lever, the "opposite end of which carries a weight. The switches are "worked" by a hand lever mounted on the same pin as the bell-crank lever, "but moving independently of this latter, and there-"fore is not so likely to be shaken and injured," by the passage "of the train as if fixed on the shaft. By making the box a "double switch box it will answer the purpose of two single ones, "will be less expensive, and may be more firmly secured in its "seat."

[Printed, 2s. 2d. Drawings.]

A.D. 1847, January 21.—N° 11,538.

BEADON, George, and SMITH, Andrew. "Improvements "in warping or hauling vessels, which improvements are also "applicable to moving other bodies." One improvement consists in hauling carriages "on railways or tramways by means of ropes, "chains, or bands." The patentees claim "an improved con-"struction of expanding reel or whelp wheel, whether applied "to the warping of vessels upon inland or other waters, or upon "land, for moving engines and carriages upon railways, and also "the arrangement of the machinery employed in connection with "such whelp wheel or reel for guiding the warping rope or chain "on to the reel, and making it 'taut' upon the whelps thereof." Also a "modification whereby the nip is given to the warping "rope, or to hoop iron used as a warp, by means of friction "rollers."

[Printed, 2s. 8d. Drawings. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 187; Patent Journal, vol. 3, p. 238; Engineers' and Architects' Journal, vol. 10, p. 201.]

A.D. 1847, February 12—N° 11,577.

HEDGE, Robert. "Certain improvements in rails for railways "and in the manner of securing them." "The rail is formed "with an upper and lower table connected together by a rib, the "upper table being made with projecting shoulders, which rest

" on the sleeper, and the lower table to be inserted in the sleeper, " so that the rail may be firmly clamped to and secured in a con- " tinuous longitudinal sleeper. . . . . Rails of the form and " secured as above described, may be made of cast iron, since, " from the continuous support which the rail will receive, both " vertically and laterally, from the timber, and from the manner " in which it is clamped to or secured in the longitudinal sleepers, " fractures will be extremely unlikely to occur, and in case of any " fracture the road will not be deranged by the displacement of " the fragments."

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 103; Patent Journal, vol. 3, p. 338.]

A.D. 1847, February 24.—N° 11,597.

WILD, Charles Heard.—"Improvements in constructing " parts of railways." "In the construction of switches, ... it " is usual to form the moveable tongues so that their ends may " be placed in notches formed in the fixed rails, the consequence " of which arrangement is, that the moveable ends or points of the " tongues must either be made very thin, or else very deep notches " must be made in the fixed rails, both which arrangements are " objectionable . . . . According to the first part of the inven- " tion, the notches in the table or upper part of the fixed rails are " dispensed with, and the points of the tongues are so constructed " that they may pass below, and be housed under the upper part " of the fixed rails. The upper surface of the improved tongue " rail is also made lower than the fixed rails at the point, and for " a considerable distance beyond. The tongue rail thus constructed, " when in action, will act laterally against the flanges of the " wheels for a considerable length from the point before the " wheels come to be borne by the upper surface of the tongue. . . . . In the improved method of constructing moveable tongue " rails, the upper part of the points of such rails is bevelled off " upon both of its faces, so as to make the upper side of it in the " form of a wedge, the thin edge being uppermost, and the point " is kept so far below the bearing surfaces of the adjacent fixed " rails, that for a considerable distance from the point the move- " able tongue only acts laterally against the flanges of the wheel " passing along the railway. No weight is taken by the tongue " rail for a considerable space, extending from its point to a place

" where it gradually rises to a level with the adjacent rails, the " tongue rail having at such place become sufficiently strong for " this purpose. Owing to the bevelling of the upper surface . . . . " and the lowering the point of the tongue rail, a portion of the " thickness of it when brought into contact with the adjacent " fixed rail is housed under the bearing surface" of it. This construction of the tongue rail enables the point thereof to be made " sufficiently strong, " without having recourse to the objection- " able expedient of notching the bearing surface of the fixed rail " against which it is to be placed." There are also described improvements in the construction of turntables, consisting in a mode of " counterbalancing the top of the table by a lever appa- " ratus, and the arrangement of conical rollers, with all their " upper bearing edges in the same plane, so that, although by the " surge or lateral force of trains passing over the turnplate the " top plate may be driven somewhat out of its proper position, " the top plate will still bear evenly and equally upon the rollers;" and in placing the rails across turntables, and arranging or combining such turntables "when arranged or placed diagonally " across parallel lines of railway, that when the tables are not in " action, the through line and the diagonal line of rails may at all " times be complete, so as to allow of the passing of a vehicle " across the table and along either of those lines," and so save a considerable amount of the labour necessary for transferring vehicles from one line to another.

[Printed, 2s. 4d. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 193; Patent Journal, vol. 3, p. 308; Engineers' and Architects' Journal, vol. 10, p. 330.]

A.D. 1847, March 23.—Nº 11,631.

FOX, CHARLES.—(*A communication.*)—" Improvements in the " permanent way of railways, and in carriages to be employed on " railways;" namely, " in constructing permanent way with " double rails instead of single rails at each side of the way, so " that the flanges of the carriage wheels which run on the way " may pass between the double rails on each side of the carriage; " and in constructing the switches for such double-railed ways; " and in a mode of securing railway chairs in their proper places " upon their sleepers."

The rails are inclined towards one another " for the purpose of " presenting a greater resistance to the side motion of the engines

" and carriages." The wheels have their flanges in the centre of the tires.

[Printed, 1*s.* 2*d.* Drawing.]

A.D. 1847, March 23.—N° 11,637.

TIBBITS, William Bullock.—" Certain improvements in " obtaining and applying motive power."

According to this invention atmospheric power is utilised for railway propulsion through the medium of fixed propelling wheels, A fan is placed between two lines of way, and its axis passes to each line where it drives a propelling wheel between the rails of each line. By means of suitably arranged apparatus, to be acted upon by the train itself, air from an atmospheric main is turned on to the fan causing it to work in one direction or the other as desired. Underneath the carriage is a pair of bars, which, by suitable means are caused to approach or recede from each other. When they approach they are able to grip in passing, the wedge-shaped periphery of the propelling wheel, which accordingly drives the train. Instead of propelling wheels, the fan may work traction ropes.

[Printed, 1*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 47, p. 371.]

A.D. 1847, March 27.—N° 11,641.

MAY, Charles.—" Improvements in railway chairs, the fastenings to be used therewith, and in trenails." In manufacturing railway chairs " the mould is formed in a similar manner to that " described in the Specification of Ransome and May's Patent, " of February 1841, in which side plates of metal are used to " form part of the mould, and for guiding and supporting the " core. This part of the invention consists of forming the core " for the interior of the jaw of a chair with sand upon a metal " interior or core bar, combined with the using of metal side " plates or surfaces as part of a mould, and as supports to the " core." The invention also consists " of having a cross bar " attached to the flask, into which the tail end of the core projects; and using metal cores for casting the holes for the trenails " or fastenings." Another part of the invention relates to " the " manufacture of wood fastenings used with railway chairs, and " of wood trenails. In practice, such fastenings frequently become " swelled " by exposure to moisture. " It is desirable to retard

" the swelling process, and this is accomplished by covering them " with any repellant of water, as varnish or grease, but it is not " intended that this shall permanently repel moisture, as they are " required to swell after driving."

The patentee also impregnates the wood fastening with some preservative before compressing it into shape.

[Printed, 1s. 2d. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 260; Engineers' and Architects' Journal, vol. 10, p. 390.]

A.D. 1847, March 29.—N° 11,642.

GRIESBACH, John Henry.— Improvements in the construc- " tion of railways, and in engines and carriages to run thereon." The invention consists in arranging guide rails to the ordinary rails of " a railway, and combining therewith horizontal wheels, " in such manner that railway carriages may run with more safety, " and yet be able to pass with freedom from one pair of rails to " another pair of rails without requiring flanges on the wheels." When on " a turntable, the guide rails for the horizontal wheels " are applied to the turntable as well as to the rails, so that a car- " riage with unflanged wheels will be retained on the rails cor- " rectly when being removed from one set of rails to another over " the turntable." The guide rails are combined with the switch apparatus.

[Printed, 1s. 4d. Drawings. See Repertory of Arts, vol. 10 (*enlarged series*), p. 287; Patent Journal, vol. 3, p. 457.]

A.D. 1847, April 6.—N° 11,648.

STRATTON, Benjamin Tucker.—" Improvements in railways, " and in wheels and other parts of carriages for railways and " common roads, partly applicable in the construction of ships or " other vessels, and improvements in machinery for manufacturing " certain parts of the same." The improvements in railways refer to " the mode of constructing the rails or bars on which the " carriages are to run, ... the said bars consisting of a hollow " ridge of any suitable section, with a flange extending along " each edge, and forming the base of the ridge, and the said " flanges having holes to receive the bolts by which the bars are " secured to the sleepers. . . . . The improvement consists in " attaching to the under side of the flanches a bar or plate of iron " extending from the outer edge of one flange to the outer edge " of the other, and as an additional security the bar or plate may

" be turned up at the edges, so as to clip or embrace the flanches. " . . . . The tie plates may either extend the whole length of " the rail bar, or be applied in short pieces at intervals along the " flanges. The tie plates may be connected to the flanges of the " rails by bolting or rivetting," but it is considered preferable " to unite the tie plate to the rails by welding."

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 344.]

A.D. 1847, April 28.—Nº 11,679.

BROAD, Robert.—" Improvements in railway turntables."

[No Specification enrolled.]

A.D. 1847, April 29.—Nº 11,680.

BROOMAN, Richard Archibald.—(*A communication.*)— " Certain improvements in railway turntables." The leading or characteristic features of the improved turntables are, " that " the table, when required to be turned, is raised by the pressure " of a fluid, and sustained whilst being turned upon the fluid by " the pressure of which it was so raised, and when turned to the " required position, lowered by withdrawing that pressure, and " that the table when not required to be turned rests on continuous or solid stationary bearings under the passing weight, " instead of on a central column, or on rollers." " The operation " of turning the table is as follows :—The carriage which is to be " turned and run on to another line of rails, or reversed, having " been run upon the table, one or two strokes of the pump will " raise the table from its bearings. The table with its load will " then be sustained by a central column or pillar resting on a " fluid, and may be turned with great facility." The water is then run off and the table allowed to sink to its fixed bearings in the new position.

[Printed, 1*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 47, p. 467; Patent Journal, vol. 4, p. 6.]

A.D. 1847, May 6.—Nº 11,694.

FOX, Charles, and HADDAN, John Coope.—" Improve-" ments in railway chairs and switches, in trenails or fastenings, " and in machinery for preparing railway sleepers." The first part of the invention is " an improvement in the construction of

“ railway chairs; it consists in making the smaller ends of the “ taper holes for the reception of trenails for fastening them upon “ the sleepers with the extremities or edges thereof rounded, and “ in making the railway chairs with studs on the under surface “ to fit into corresponding holes to be made in the sleepers upon “ which they are to be placed. . . . . The object of these studs “ is to prevent or diminish the lateral movement of the chairs, “ lessen the strain upon the trenails, and preserve the position of “ the chairs upon the sleepers.” The second part relates to “ an “ improvement in the construction of railway switches; it con- “ sists in a mode of constructing the moveable tongue rail or rails “ of a railway switch, so that the same shall move or act vertically “ instead of horizontally.” The chairs are of a construction generally used, except where they receive the tongue rails, having there a portion of their seats made with inclined planes, “ so as to “ receive and support the wedges, by means of which the tongue “ rails are raised or lowered. . . . . The seats of the chairs are “ made sufficiently deep to allow the tongue rail which is to be “ placed within it to descend so far as to be out of the reach of “ the flanges of the carriage wheels passing along the railway. “ The rails, which are placed within any of the chairs, which has “ also a tongue rail placed within it, must be secured to the sides “ of such chairs by screw bolts. . . . . When a switch is fur- “ nished with two tongue rails,” the wedges are fixed upon the connecting bar at one side, “ with their points in a direction “ opposite to the direction of the points of the wedges on the “ other side, and the inclined planes within the seats of the chairs “ are also placed in opposite directions, and the wedges and appa- “ ratus connected therewith are arranged in such a manner that “ when the tongue rail on one side of the line of rails shall be “ raised by the action of the wedges underneath it, the wedges “ under the tongue rail on the other side of the line of rails shall “ be drawn back, so as to allow the tongue rail above them to “ descend, and so be out of action.” The invention further embodies “ an improvement in the manufacture of trenails or “ fastenings; it consists in forming such trenails or fastenings “ by cutting or shaving pieces of wood into the required shapes “ of the trenails by means of self-acting machinery, instead of by “ the ordinary lathe, and gouges or chisels, which are moved “ and held by the workman.” And also “ an improvement in “ *the preparation of railway sleepers*;” it “ consists of improved

" machinery for preparing such sleepers, such machinery having " revolving cutters, and the sleepers when being prepared passing " over the top of the machinery with their faces downwards."

[Printed, 3*s*. Drawings. See Patent Journal, vol. 3. p. 594.]

A.D. 1847, May 24.—N° 11,715.

ADAMS, William Bridges, and RICHARDSON, Robert.—"Certain improvements in the construction of railways, and of " engines and carriages used thereon, and also in transport and " storage arrangements for the conveyance, management, and pre- " servation of perishable articles." The invention consists in, " firstly, improved modes of securing the joints of the rails to " render them more firm and durable and prevent the dangerous " 'tipping' of the joint sleepers; for which purpose two cross " sleepers" are used, one at each side of the joint, instead of one " cross sleeper directly under the joint, and a chair is placed on " each sleeper beneath each of the two rails, or a double-headed " chair is fixed to hold the two cross sleepers in their proper " position, such double chair having separate bearings for the " ends of the rails in such mode that the joint between the two " rails may be above the opening between the sleepers, whether " the double chair or the two single chairs be used, and a single " cross sleeper may be used with the double-headed chair. And " to connect the two iron rails together wood or metal fishes" are used, driven in, " on one or both sides of the rails, so as to fix " them firmly between the two rails and the two single chairs or " the double chair in such mode that the fishes will support the " rails vertically, either with or without the rails bearing on the " bottoms of the chairs; and the two rails may abut square " together or be scarfed." A mode of "applying double sleepers " in combination with rails in two halves, formed of two separate " bars placed vertically against each other and secured in the " chairs" is described, "such rails being applied so that each " joint of the half rail may be in lateral contact with the solid " part of the other half rail, technically understood as 'break " joint.'" Secondly, " laying rails so as to enable engines and " carriages to pass very sharp curves and obviate the necessity of " using turntables for the purpose of reversing such engines and " carriages. To accomplish this object the outer rail" is broken off, "or the distance between the rails" is widened "a yard or

" two beyond the commencement of the curve, and for the outer " rail a plain surface of wood, stone, or iron," is substituted, " serving as a train rail on which the peripheries of the flanges of " the outer wheels will run;" this surface is raised considerably, " sloping towards the inner rail, so that the gravity of the carriage will have a tendency to keep the inner wheels on the " inner rail, and the outer wheels, running on larger diameters " than the inner, will facilitate the movement round the curve." Thirdly, making chairs of wrought iron, by rolling or swaging. Fourthly, "the application of steel or steeled iron bars to form the " rails for engines and carriages to run on." Fifthly, "the application of terminus buffers to receive the shocks of trains arriving " at terminal stations," such buffers "consisting of disc or other " springs in combination with air pistons, so that violent recoil " may be prevented, the air piston either fitting the air chamber " loosely to prevent the passage of air, or a hole being pierced in " the air chamber, so that the air will offer elastic resistance to " the force of the shock while being driven through the hole, " and the power of the disc or other springs in the recoil will be " regulated and moderated by the slow indraught of the air " through the hole to refill the air chamber."

[Printed, 2s. 6d. Drawings. See Practical Mechanics' Journal, vol. 2, p. 8; vol. 3, p. 69; and vol. 4, p. 147; Artizan, vol. 7, p. 28; and vol. 9, p. 148.]

A.D. 1847, May 27.—N° 11,718.

ALLAN, ALEXANDER.—"Certain improvements in turntables " to be employed on or in connection with railways, part or parts " of which said improvements are also applicable to the construction of tubular boilers." The improvement consists in constructing the main frame of turntables of wrought iron instead of cast, and in having "more than one line of railways running " parallel with each other upon the same turntables;" also an " improved apparatus," called "the 'hydrostatic or 'floating " 'turntables,'" which may be described as follows:—The main "frame or platform of the turntable" is immersed in a suitably constructed reservoir "filled with water or other fluid, " the height of which fluid is proportioned to the maximum " weight intended to be conveyed across the table, and the proper " quantity of fluid, when once ascertained, is rendered constant " by *an ordinary ball-cock or* other contrivance placed in con-

" nection with a cistern or other source by which the reservoir is " supplied."

[Printed, 1*s*. Drawing. See Patent Journal, vol. 4, p. 26.]

A.D. 1847, May 27.—N° 11,721.

THORNEYCROFT, GEORGE BENJAMIN.—" Improvements in " the manufacture of rails for railroads," namely, " in making a " piece of iron to form the wearing part of the rail of one homogeneous substance without piling or faggoting in any way, being " free from joints. To accomplish this take pig or refined metal " of the best quality, and puddle it in the most perfect manner, " and make one ball of sufficient weight to form the slab or " bloom " required " for the wearing part of the rail, or, if more " convenient, put two or more puddled balls together while the " iron is in a maiden state, and before any part of it has been " operated upon, to make it solid or nearly approaching to solidity, " so that a perfect union may take place . . . . Having thus " got the proper weight of iron in one perfect mass, instead of " working it down and piling and working it down again in " rolls, or by hammers," the requisite ductility is obtained when the iron has been " compressed sufficiently to make its specific " gravity about the same as when piled and re-rolled down into " what is called Number 2 or Number 3 bars, which is what is " generally used on the outer surface of the pile or faggott of " which railway bars are generally made." To make what are called " antilaminating rails from puddled iron . . . . take pig " or refined metal and make it malleable in the charcoal refinery, " bringing it out in one lump of sufficient weight to make the " slab or bloom which is to form the wearing part of the rail."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 10 (*enlarged series*), p. 345; London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 193; Patent Journal, vol. 4, p. 31.]

A.D. 1847, June 10.—N° 11,738.

DARLING, WILLIAM.—" Improvements in moulding, and in " the manufacture of certain articles of cast iron." The invention relates to a " means of producing cast iron railway chairs by the " use of moulds composed of cast iron or other metal; to an " arrangement of machinery or apparatus which facilitates the " application of melted iron to the moulds of railway chairs,

" whether such moulds are composed of metal or other suitable " material; to the annealing of railway chairs; and to the em- " ployment of melted iron taken directly from the smelting furnace " in the production of railway chairs."

[Printed, 10*d.* Drawing. See Mechanics' Magazine, vol. 47, p. 603; Practical Mechanics' Journal, vol. 1, p. 15; Patent Journal, vol. 4, p. 80.]

A.D. 1847, June 12.—N° 11,741.

JOHNSON, James.—" Improvements in machinery for the " manufacture of rivets, railway or other pins, bolts, nuts, and " spikes." The invention consists in "arranging a carrying bar " or bed with dies, and causing the same to move step by step to " the upper die or punch;" and also a "mode of arranging appa- " ratus for cutting lengths of rods for making rivets, pins, bolts, " and spikes."

[Printed, 1*s.* Drawings. See Repertory of Arts, vol. 11 (*enlarged series*), p. 90; Patent Journal, vol. 4, p. 123.]

A.D. 1847, July 7.—N° 11,788.

SADLER, John Harvey.—" Improvements in constructing " bridges, aqueducts and similar structures."

Part of the invention has reference to the construction of cast-iron bridges, the flooring of which is made up of cast-iron plates dowelled together. Alternate plates are made stronger and are pierced for the chair bolts.

Another part is descriptive of a manner of fixing girders for trains to run upon instead of the ordinary rails. The outside girders are high and constitute the balustrade or wall to bridges, &c.; the others are lower with broad tops or tables for the wheels to run on. These are stayed together and a flooring is laid between them.

Finally, there is described a railway made of cast-iron girders, connected by stays.

This railway may be laid across a "tolerable level country, in- " asmuch as a railway to any desirable distance may be erected at " at once for traffic, and, if thought necessary embankments, &c. " could be made at any time afterwards."

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 11 (*enlarged series*), p. 93; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 22; Engineers' and Architects' Journal, vol. 11, p. 75.]

A.D. 1847, July 29.—N° 11,819.

BAINES, William.—"Improvements in the manufacture of "parts of railways and in bearings of machinery, and in apparatus used in constructing railways." The invention comprises, firstly, improvements in the construction of railway chairs. These chairs "are intended to hold the rail without wedges or keys," by placing the two jaws at a distance from each other in such manner that when "they are fixed the rail between the jaws will "be supported on both sides, the opening in the chairs being so "made as to be correctly filled by the rail. . . . . In placing "a chair on to a rail the chair will require to be inclined to the "line of the rail, in which position the rail may readily be passed "through the opening in a chair, or a chair be passed on to a "rail, but so soon as the chair is brought into" another position "the rail will be securely upheld and nipped between the two "jaws of the chair." Secondly, to the construction of joint chairs for railways. "This chair is formed with two jaws, one "being much higher than the other, and it has a hole through it "to receive what is called a fixing pin, the stem of which is formed "square, and the head of it forms, when fixed, the upper part" of one of the jaws. The stem of the fixing pin "has a notch in "it, by which it is retained secure," when one of the holding-down pins is driven in. "The two ends of the rails are to be "notched out to admit of the passage of the stem of the pin, "by which means the rails will be securely retained from rising "above one another." Thirdly, to improvements in railway chairs for the switch rails, having for its object "the so forming "the upper parts of a chair that there shall be inclined planes for "carrying off any dust or matters which may have been liable to "accumulate between the tongue rail and the main rail and "chairs." The invention also relates, fourthly, to "an arrangement of switch box and apparatus for moving the tongue rails "of switches of railways;" wherein precautions are taken to guard against the lodgment of dirt. The tongue rails move on friction rollers. Fifthly, to a method of joining or scarfing rails; and, sixthly, to "combining machinery in such manner as to "gauge the rails and hold them securely during the boring the "sleepers for the chairs and whilst fixing the chairs, by which "the laying of rails and fixing chairs will not only be facilitated

" but the work more correctly done." The inventor disclaims so much of the title as relates to " bearings of machinery."

[Printed, 2s. 8d. Drawings. See Patent Journal, vol. 4, p. 280; Artisan, vol. 7, p. 161 (*with Disclaimer*).]

A.D. 1847, August 3.—N° 11,829.

YULE, JOHN.—" Certain improvements in chairs used on rail- " ways, and in the fixing of the same."

No English specification enrolled.

[Practical Mechanics' Journal, vol. 1, p. 14 (*notice of Scotch Specification.*)]

A.D. 1847, September 2.—N° 11,852.

MADIGAN, RICHARD. — " Certain improvements in railway " turntables." The invention consists in making the parts of turntables " partly of wrought iron and partly of cast iron com- " bined together. . . . . The apparatus consists principally " of three parts; first, of an under framework, which is " stationary; second, of the table, which is moveable round " its axis; and, third, of a 'motion' or framework for retaining " in their proper places such antifriction rollers as may be em- " ployed for enabling the upper table to be turned readily and " smoothly round with its load upon it." The invention has also for its object " the constructing of railway turntables in such manner " that while they shall be capable of transferring carriages from " one line of rail to another line of rail crossing the same, they " shall leave both the main lines of rails unbroken and uninter- " rupted, instead of the main lines of rail being, as usual, con- " tinued along the tables themselves." Railway turntables are also built " with horizontal antifriction rollers, which are at- " tached to the rail platform by means of pins, on which they " turn easily and roll against the curb, which is turned or bored " of a cylindrical form at that part against which the rollers " work;" a step is used for the central pivot to work in, " which " is connected to the curb by tie rods." The curb and step are both firmly bedded on a suitable foundation. The patentee also claims the use of an " inverted air-tight cup for protecting the " central pivot and step from water, dirt, &c."

[Printed, 3s. 2d. Drawings. See Mechanics' Magazine, vol. 48, pp. 289 and 315; Patent Journal, vol. 4, p. 374.]

A.D. 1847, October 21.—N° 11,916.

SHAW, Richard.—“ Improvements in the manufacture of “ wrought-iron railway bars and railway chairs.” It consists of improvements in piling iron for, and in making wrought-iron “ railway bars, of manufacturing wrought-iron railway bars with “ protecting rails or flanches, in such manner that the working “ heads or surfaces of the rails stand above the supports of the “ protecting flanches. Of constructing railway bars with hollow “ heads or working surfaces, in such manner that the cheeks of “ the chairs may pass under the hollow and give support thereto. “ Of rolling railway bars, and certain parts of railway bars, by “ three rollers placed one above the other. And a new con- “ struction of railway chairs,” in which “ a cheek in each chair “ is suitably formed to come under and support the protecting “ rails and a part of the railway bars, or the part only where such “ rails are used; or the cheek is so formed as to enter into the “ hollow head of the hollow rails.”

[Printed, 1*s.* 10*d.* Drawings. See Repertory of Arts, vol. 11 (*enlarged series*), p. 328; Patent Journal, vol. 4, p. 548; Engineers' and Architects' Journal, vol. 11, p. 170.]

A.D. 1847, October 21.—N° 11,918.

NEVILLE, James.—“ Certain improvements for conveying “ goods and passengers on railroads, parts of such improvements “ being applicable for driving, or driving other descriptions of “ machinery.” The invention consists “ in a mode of using or “ applying a flexible ” and continuous tube made of the strongest navy canvas, coated with a solution of marine glue, so as to render it air-tight and durable; and where great pressure may be required, sometimes two or more thicknesses of such prepared canvas with double or treble stitching on each selvage are used; or the tube may be woven as one continuous cylinder without a seam, but in either case “ such tube or hose should be “ sufficiently strong to resist an internal pressure of at least “ thirty pounds per square inch on the flexible hose.” This hose is to be continued to and forms a communication with “ certain “ stationary air vessels worked by steam engines placed at any “ distances along the line which may appear most suitable or “ convenient for the traffic of such railroad.” To each stationary engine are attached two (or more) rotary force pumps for compressing the air. The carriage is propelled by passing the flexible tube between two rollers, which raise it somewhat from the ground. The air is compressed, and the effort it makes to fill the tube and to pass the rollers, forces the latter along the tube and the carriage with them.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1847, November 2.—N° 11,934.

DUNN, THOMAS.—" Improvements in the manufacture of rail-
" way wheels and axles, and in machinery and apparatus for
" placing carriages on to a line of rails, for removing them from
" one line of rails to another, and for turning them." The invention consists " in improved traversing trucks or lorries running
" upon cross rails placed on the same level as the rails of the per-
" manent way, on which railway carriages may be removed from
" one line of rails to another, and turned when requisite upon a
" turntable placed between the lines of the railway, or in any
" other convenient position." The claims comprise " the move-
" able length of rail forming part of the permanent way; the
" cams or other agents for raising the same to make inclined
" planes for the carriages to ascend on to the traversing truck or
" lorry, and to descend from the same; the peculiar shape of the
" lorry, which admits of the rails being kept very little above the
" level of the permanent way; the flanges of cross rails; the
" wheels of the traversing truck or lorry, which are made without
" flanges, thus obviating the necessity of making grooves or re-
" cesses in the rails of the permanent way; and the turntable,
" when used for turning the traversing truck or lorry with the
" railway carriage upon it."

[Patent, 1*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 48, p. 452; Practical Mechanics' Journal, vol. 2, p. 153; Patent Journal, vol. 5, pp. 121 and 152; Engineers'and Architects' Journal, vol. 11, p. 169.]

A.D. 1848, January 5.—N° 12,014.

FROUDE, WILLIAM.—" Improvements in the valve used in
" closing the tubes of atmospheric railways." The patentee claims " the constructing and applying a valve or diaphram of
" greater width than the boundaries of the seat in which it is
" to rest, and in such manner that the edge or edges of the
" diaphram or valve along the line or lines of opening shall
" be so formed that when strongly pressed the line or lines of

" opening shall be closed and rendered air-tight, or nearly air-
" tight, by straightening or comparatively straightening that
" bent or angular form of cross section which the valve is to be
" made capable of assuming when free, the excess of width
" which the diaphram or valve endeavours to resume being pro-
" vided for, either by sufficient extensibility in the seat of the
" valve, or sufficient compressibility in the parts of the valve
" itself, or by both of these methods combined. And, further,
" it is essential that the point of principal flexure in straighten-
" ing the valve shall be carried either beyond the straight line,
" (joining the centres of pressure at the sides or abutments of the
" diaphragm), or so near it that the elasticity brought into action
" by the straightening shall tend to keep the same closed, or
" otherwise not be able to cause the valve to resume its angular
" or bent form."

[Printed, 8*d.* Drawing. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 10; Repertory of Arts, vol. 12 (*enlarged series*), p. 90; Artizan, vol. 6, p. 227; Patent Journal, vol. 5, p. 177; Engineers' and Architects' Journal, vol. 11, p. 248.]

A.D. 1848, January 13.—N° 12,024.

THOROLD, WILLIAM. — " Improvements in turntables, " namely, a " centre pin, having a circular inclined plane and " ratchet combined . . . . by turning the centre pin the " frame can be raised or lowered as may be required." A " circular shield " to divert any extraneous matter from the working parts, and a " sweeper attached to the roll frame " to carry any such matters into a receptacle through an aperture in the bottom frame; modes of constructing and arranging the working rollers, constructing the top frame " in several divisions " or compartments," and of various materials, of constructing turntables without centre pins, of casting the working parts of turntables on chills, of " constructing the larger kinds of turn- " tables with moveable joints in the girders or beams supporting " the rails," and also " a more perfect mode of stopping such " tables at the point for communicating with the line of rail;" a " method of constructing the larger kinds of turntables so that " the power of a locomotive engine can be applied to turn the " table when loaded with the engine and its tender, when the " same shall require reversing on the line of railway;" con- " structing single slide tables in an economical mode," and

" raising or locking the centre of turntables when they require turning."

[Printed, 2*s*. Drawings. See Repertory of Arts, vol. 12 (*enlarged series*), p. 182; Artizan, vol. 6, p. 249; Patent Journal, vol. 5, p. 225; Engineers' and Architects' Journal, vol. 11, p. 303.]

A.D. 1848, January 27.—N° 12,046.

BARLOW, William Henry.—"Improvements in the manufacture of railway keys." The invention consists "in so treating and impregnating wood keys for railways with matter which is insoluble in water that the keys when used shall not be liable to expand or contract. . . . . The wood keys having been cut to the desired form, they are to be steamed for about four hours, they are then dried at a temperature a little below boiling water for a period of from eighteen to twenty-four hours, by which they are considerably shrunk, and on being taken from the drying stove, and whilst hot, they are to be subjected to the saturating process, which may be done by simple immersion for about sixteen to twenty-four hours; or the process of saturation may be greatly facilitated by placing the wood keys in vessels and removing the air, and then admitting the composition, as is well understood in saturating wood with various ingredients for other purposes."

The patentee proposes the use of a mixture of creosote, naptha, pitch, and linseed oil for the saturating composition.

[Printed, 4*d*. No Drawings. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 46; Repertory of Arts, vol. 12 (*enlarged series*), p. 391; Artizan, vol. 6, p. 228; Patent Journal, vol. 5, p. 256; Engineers' and Architects' Journal, vol. 11, p. 304.]

A.D. 1848, May 9.—N° 12,149.

GORDON, Lewis Dunbar Brodie.—"An improvement or improvements in railways." The invention consists "in forming the ends of the rails so as to make an 'underlap' joint, the rails being laid so that the end of one rests upon the end of another. . . . . The joint is cut so that a stop may be introduced into the chair to prevent the rails travelling through the chair, a circumstance well known to those practically acquainted with the maintenance of the permanent way." The patentee also adapts "thin sheets or plates of malleable iron to form either cross sleepers or longitudinal bearings for supporting *the rails.*" *He* strengthens the sleeper "by a brace or

" braces; the centre hole in the sheet iron receives a malleable " iron 'ring post,' which is fixed in its place by casting round " its end a button of iron; the brace must be put in its place " before the metal is cast, and is fixed by the metal of the chair." He strengthens or fishes "the rail at the joint by means of a " trough or other guider of malleable iron. The chairs next the " joint are made with a projection at one side, and the sleepers " are two feet two inches or so apart. The trough girder rests " on the projection of the chairs, and supports the ends of the " rails." "A screw" is used "for fastening the rail in the chair. " It works through a nut which fits into a recess cast in the " chair; there is a slot for the purpose of allowing the screw and " nut to be put in or taken out without unscrewing the nut."

The invention also includes a method of preserving keys.

[Printed, 1*s*. Drawing and woodcuts. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 91; Mechanics' Magazine, vol. 49, pp. 420 and 474; Artizan, vol. 7, p. 83; Patent Journal, vol. 6, p. 61; Engineers' and Architects' Journal, vol. 11, p. 370.]

A.D. 1848, August 11.—Nº 12,237.

HEWITT, SAMUEL GEORGE.—" Improvements in certain parts " of railways." The invention consists in the construction of turntables with the objects of saving expence in foundations, and affording easy access; also in the application of timber in constructing large turntables of this kind. "The contrivance " intended to receive the shock and relieve the turnplate from " the sudden weight of a vehicle, consists of a roller in a frame, " which may form a part of the curb placed under the extremity " of each main beam; a part of the length of the rails at each " end is kneed and fixed by a pin, which allows it to move up " and down freely; the other end reaches to and rests on the " top of the roller. The part that touches the rollers is bevelled " from the middle towards each end; when properly adjusted " the surface will lie on the same level as the other rails, and " receive the wheels of an engine; and as the lower part rests " on the roller, the shock or concussion will be communicated to " them, and the weight gradually received by the table as it " advances along the rail." "In connecting the main lines of " rails with the turnplates by novel arrangements of curved lines " with moveable or switch rails and points, and with turnplates." " In having three" or more "main lines arranged and combined " *with one turnplate*, which will require not more than one turn

" in removing a vehicle from one line to another." In the " application of mechanical arrangements to the moveable or " switch rails, which an engine in its progress along the rails can " act upon, so as to place the switch rails in a proper position " for being passed over before it arrives at the switch or moveable " rail."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 50, p. 163; Artizan, vol. 7, p. 155; Patent Journal, vol. 6, p. 186.]

A.D. 1848, December 9.—N° 12,360.

GARDNER, John.—" Improvements on girders for bridges and " other structures."

The improvement consists in constructing girders and such structures of cast iron strengthened by wrought-iron bars " embodied or dovetailed into the same."

Applications of the principle to permanent way are shown, in which wrought iron rails are dovetailed into cast-iron supports or sleepers, one being table shaped, the other convex.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 399; Mechanics' Magazine, vol. 50, p. 560; Patent Journal, vol. 7, p. 109; Engineers' and Architects' Journal, vol. 12, p. 250.]

A.D. 1848, December 21.—N° 12,384.

BAKER, William, and RAMSBOTTOM, John.—" Improvements in the construction of railway wheels and in railway " turntables, which latter improvements are applicables to certain " shafts or axles driven by steam or other motive power." The improvements consist " in combinations and arrangements of " cones, cylinders, or spheres, revolving and travelling freely " between two surfaces, for giving greater support and rigidity to " the moveable tops of railway turntables when carriages are " passing over them. . . . . The upper surface of the bottom " plate is cast with any convenient number of grooves, in which " are placed the spheres, and the under surface of the table top " is provided with corresponding grooves and is supported by the " spheres." It is preferable to have the external groove " almost " full of spheres and the others about half full," by this means almost perfect solidity at the edge of the table is secured, and a sufficient number of bearing points in the other parts. " The " grooves in *which the spheres* rotate are made with a larger

" radius than the radius of the balls, so as to diminish the " working surface of the balls upon the top and bottom plates."

[Printed, 1*s.* 6*d.* Drawings. See Mechanics' Magazine, vol. 50, p. 620; Patent Journal, vol. 7, p. 132.]

A.D. 1849, January 13.—N° 12,417.

GREENHOW, CONRAD HAVERKAM.—" Certain improvements " in atmospheric railways." The inventor " proposes that the " tube," which is resilient, " shall be suspended at intervals of " six feet in a sling of malleable iron one-eighth of an inch in " thickness and three inches broad, in such manner as to avoid " damaging the tube by rivetting. The sling is to be rivetted to " upright supports, one on each side, which are bolted down to a " sleeper. The sling must embrace the tube on each side to " within twenty-five degrees of the longitudinal slit on the vertex " of the tube, and be rivetted to the upright supports. . . . . By " this means the weight of the tube in the sling will have a tendency to draw the points of the standards or upright supports " together, and their pressure on the tube will assist its elasticity " in closing the longitudinal slit after the passing of the coulter. " To facilitate the opening of the longitudinal slit for the passage " of the coulter" four horizontal wheels are used, " two inclined " towards one side of the tube and two towards the other. The " distance between the extreme edges of the wheels should be " one-half of an inch greater than the internal diameter of the " tube, so that as the wheels advance through the inside of the " tube they increase its horizontal diameter and cause the slit to " open to twice the distance of the increase in the horizontal " diameter. . . . . Immediately behind the coulter there is a " valve in the tube which forms the piston rod, and by opening " this valve air will pass through the piston rod into the exhausted tube before the piston, and so assist in retarding the " train by destroying the vacuum in case of any emergency occurring to render it necessary to do so." The patentee also claims a method of attaching the coulter to the piston and carriage, a plan of preventing the swerving of the coulter, and an " exit valve." He obtains a vacuum in the tube by causing water to fall from an air-tight vessel or vessels to its barometrical level.

[Printed, 10*d.* Drawing. See Mechanics' Magazine, vol. 51, p. 64; Patent Journal, vol. 7, p. 172.]

A.D. 1849, January 23.—N° 12,438.

BARLOW, William Henry.—" Improvements in the con-
" struction of permanent ways for railways." " In constructing
" the wrought-iron rails of railways so that each rail shall form its
" own bed in the ballast without requiring the use of chairs or
" sleepers " or other expedients for supporting the same. " In
" order to effect this the rail is made of greater width than here-
" tofore employed, and may be composed of two or more parts.
" . . . . The rails are connected together at the joints by wrought-
" iron shoes, and the distance between the rails or guage is main-
" tained by wrought-iron cross ties, which also serve to give
" additional bearing surface in the ballast. At the joints the
" shoes are bolted to the rail by means of wrought-iron bolts and
" nuts, and the wrought-iron ties are bolted to the rail and shoes
" by similar wrought-iron bolts. . . . . The object attained is
" the exclusion of the use of timber in the permanent way, and
" thereby avoiding the cost of renewing the same when decayed."
Also in " a mode of giving support to the joints of the rails
" ordinarily employed, which mode is applicable to rails, chairs,
" and sleepers. It is accomplished by rolling or forming a piece
" or plate of wrought iron from a quarter to half an inch in
" thickness, of such form as will fit accurately the side of the rail.
" The length of this plate is such that it can be keyed into the
" chairs on each side of the joint chair as well as into the joint
" chair. The plate may be keyed against the rail by wooden
" keys in the same manner as the ordinary rails are keyed into
" the chairs."

[Printed, 1*s.* 10*d.* Drawings. See Repertory of Arts, vol. 14 (*enlarged series*), p. 136; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 91; Mechanics' Magazine, vol. 51, p. 93; Patent Journal, vol. 7, p. 174.]

A.D. 1849, February 6.—N° 12,452.

BROWNE, John.—" Improvements in constructing and rigging
" vessels, and improvements in atmospheric and other railways."
" The improvements proposed in the atmospheric railway is to do
" away with leakage by means of pressure. Over the orifice of
" the cylinder are two plates of iron, tin, or other substances.
" The plates are pressed together by means of a succession of
" springs which press upon a slighter board, this board pressing
" upon the iron plate, which is made into a shape best to admit

of the pressure . . . . allowing of the travelling or connecting link to go through without admitting too much of the outward air into the cylinder. Spring-wheeled pincers may be used, if required, as a further security from the admission of the outward air. These iron plates are held and continued in their position by being surrounded by leather, to the facing of which may be fixed gutta-percha on account of the friction. Above or below this range a long slip of gutta-percha or other substance may be made to act for and in the same manner as the iron plates." The patentee also proposes "having a line of rail or rails, by which means a line or chord communicating with a balloon will allow of that line with the balloon attached to travel without impediment, that is, having a line of rail of that peculiar construction that will allow a holder formed of metal or other substance, having wheels; the wheels work upwards or sideways, the power being relative, instead of downwards; this holder may be made to admit persons riding upon it who may be useful in keeping the rails clear of impediments. To this holder is attached the balloon with it car of passengers. . . . . In crossing lakes, marshes, or rivers, the line may be under water, floating upon the water, or made to go upon bridges, archways, or cemented bridges."

[Printed, 4*d*. No Drawings. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 111; Mechanics' Magazine, vol. 51, p. 142; Patent Journal, vol. 7, p. 193.]

A.D. 1849, February 28.—N° 12,492.

PARSONS, Perceval Moses.—"Certain improvements in railways, railway engines, and carriages, and certain of their appurtenances." The invention consists of, "firstly, improvements in the turntables used on railways, whereby the revolving platform when at rest is supported partly on a centre pivot, and partly on a series of moveable or temporary bearings at or near the periphery, which bearings are forced under the revolving platform by means of self-acting agents, such as weights or springs, and when the table is required to be turned, the moveable supports are withdrawn, and kept so during the operation, and the platform left supported on the centre pivot alone." "Secondly, three several improved modes of laying and securing the rails of railways, whereby the chairs generally made use of *when cross sleepers* are employed are entirely dispensed with, "and the rails secured both to cross and longitudinal sleepers "in a more durable and efficient manner than heretofore." "Thirdly, improvements in the switches of railways." To make two pairs of switch tongues, two bars are cut through by plane surfaces square with their base, and in "opposite longitudinal "oblique directions to the angle required for the points of the "switch tongues." A portion of the point is then cut off as being useless, from about where the cutting plane meets the upper part of the inclined sides. "The tongues are then ready to be "fitted to their places, the flat sides being always placed against "the fixed rails. . . . . A notch on each side is cut out of the "bottom flange or angle of the tongue rail near the thick end, "and the chair is made with a stop partly lipped over, and the "end of the tongue rail is dropped over this stop, the notch "allowing it to do so, after which it is pushed forward until the "part of the bottom flange remaining at the end touches the stop "on the chair, and is covered by the part lipped over. The fixed "rail is then keyed into the chair against the end of the tongue, "which keeps it in its place." "Fourthly, improvements in the "crossings of railways;" the point of the crossing is formed on the same principle as that of the switches, so that the points of a pair of switch tongues placed with their flat sides together will give the form of the point for a crossing of that angle, "but the "point is formed out of one piece of iron, which must be made "to the form which two pieces of the above description would "give when cut off to the angle required for the crossing and "placed together."

[Printed, 1*s*. 10*d*. Drawings. See Mechanics' Magazine, vol. 51, p. 211; Patent Journal, vol. 7, p. 239.]

A.D. 1849, March 14.—N° 12,514.

CLARKE, THOMAS, and MOTLEY, THOMAS.—"Certain im-"provements in obtaining and applying motive power; also "improvements in railroads and other roads, and in supporting "pressure, resisting strain, and protecting against fire." The patentee illustrates his invention, among other ways, by the application to the working of excavating machines. "The machine "works in the same manner as men would do with a shovel." A crank is connected to a bar, and set in motion by a spur wheel and pinion, a radius bar is attached at one end to the frame of the machinery, and at the other end to the bar before mentioned.

By the revolution of the crank, such motion is given to the shovel as to cause it to describe a curvilinear course. The shovel is not rigidly fixed to the bar, but turns on an axis, so that when it is at "the highest point it is turned round by a man by means of a handle, and its contents emptied on a platform. "The machine, "with the steam boiler and all appurtenances, turns horizontally "on a centre, therefore when the machine moves forward equal "to what the cutter is capable of cutting at each stroke, it then "moves horizontally around a centre equal to half the circle, "cutting the two sides and front parts of the 'cutting' before it "receives the next progressive motion. . . . . Cutters are to be "exchanged for the shovel whenever the ground may require it, "the purpose of these cutters being to break up the ground after "the manner of a pickaxe."

The invention also relates to a timber "trackway" for common roads, and a method of making sleepers of wood protected by iron.

[Printed, 4s. Drawings. See Mechanics' Magazine, vol. 51, p. 282; Patent Journal, vol. 8, p. 31.]

A.D. 1849, March 28.—N° 12,552.

REYNOLDS, Osborne.—"Certain improvements in railways." The patentee's "improved chairs are made of cast iron, with ribs "or knuckles, or other strengthening pieces of wrought iron, in-"corporated more or less therein in the process of casting. The "chair may be of any approved form, and the wrought-iron "pieces may also be of any forms most likely to accomplish the "object in view. . . . . A chair of this description is well adapted "for the joints of rails, where great strength is particularly desir-"able, and where the interposition of such thin plates between "the abutting ends of two rails is of no consequence. The pieces "of wrought iron ought to be thoroughly cleansed from rust, or "tinned," or otherwise prepared "before the cast iron is poured "over them." The invention also consists in "an improved "mode of constructing the keys or wedges used for fastening rails "in the chairs, whereby their ordinary tendency to become loose "after they have been for some time in use is much, if not alto-"gether counteracted, and they are prevented from falling out "under any circumstances. The key is of metal, with an india-"rubber face and a detent at the back, to secure it in its place. *And lastly in* "an improved mode of constructing splint pieces

" for strengthening the joints of rails;" the strengthening piece of the cast iron splint is of wrought iron, and imbedded in the cast iron, " all but the outer edge, which protrudes a little beyond " the outer surface of the splint." The splints are made of a combination of vulcanised caoutchouc, or other suitable elastic material, with cast or wrought iron.

[Printed, 6d. Drawing. See Mechanics' Magazine, vol. 51, p. 331; Patent Journal, vol. 8, p. 7.]

A.D. 1849, April 16.—N° 12,566.

PIROU, LOUIS PROSPER NICHOLAS DUVAL.—" Certain im" provements in tubes, pipes, flags, curbs for pavement and " tramroads."

The inventor claims the manufacture of the above articles, and " artificial rails, which could replace with great advantage those " of cast iron," by " inserting concrete or beton between two " surfaces of sheet iron."

[Printed, 8d. Drawing. See Mechanics' Magazine, vol. 51, p. 378; Patent Journal, vol. 8, p. 67.]

A.D. 1849, April 26.—N° 12,588.

FAULCONBRIDGE, WILLIAM.—" Improvements in the manu" facture of hose pipes, driving bands, and valves for atmospheric " railways."

[No Specification enrolled.]

A.D. 1849, June 5.—N° 12,633.

LAWES, THOMAS.—" Improvements in generating steam and " obtaining and applying motive power."

Part of this invention has reference to the inventors previous patent of 1845, N° 10,706. In the present case he dispenses with the long tube and employs " short ones, placed either vertically " or horizontally on the road, or by the side of it, by the addition " of gearing attached to the piston and a drum over which the " rope or chain is wound or passes."

Another part describes a method of towing or propelling canal boats, &c. The power is carried in the boat and communicated by belting, to a carriage travelling on a railway, placed on the sides or centre of the canal. " These rails may have toothed sides to " fit the carriage wheels, or otherwise, the rails at each side of the

" canal being laid down in the ordinary way, and those in the " centre being fixed on piles driven into the canal, or supported " by any construction placed over the canal."

[Printed, 1*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 51, p. 549; Patent Journal, vol. 8, p. 150.]

A.D. 1849, June 14.—N° 12,659.

BARLOW, PETER WILLIAM.—" Improvements in parts of the " permanent ways of railways." This invention consists, " first, " of casting two or more chairs on supports, ... in combination with such a plate or bearer that the use of wood or other " sleepers may be dispensed with, the plate or bearer cast with the " two or more chairs acting not only as a means of connecting the " chairs together, but also as the sleeper for such chairs." Secondly, " of casting those chairs which are to be fixed to wood " or other sleepers of railways in two parts."

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 15 (*enlarged series*), p. 72; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 397, Mechanics' Magazine, vol. 51, p. 597; Artizan, vol. 9, p. 148; Patent Journal, vol. 8, p. 151.]

A.D. 1849, June 14.—N° 12,661.

HENSON, HENRY HENSON.—" Certain improvements in railways and in railway carriages." The improvements relating to railways consist in " forms of rails for railways, and modes of " securing the same; the rail is of an oblong section, with two " projecting arms or wings, or may be rounded at the corners. . . . . At the top it is slightly bevilled inwards so as to correspond " with the usual bevil in the rims of railway carriage wheels; at " bottom it is bevilled in precisely the same way as at top, in " order that when worn away at top it may be turned upside " down, and a fresh surface brought into work. The rail is sunk " up as far as the arms or wings into a recess in the sleeper, and " is further secured by bolts passed through the arms." Also in another form of rail without any bevil either at top or bottom. " Instead of sinking one half of the rail in the sleeper in the " manner above mentioned, it may be secured to the surface " of the sleeper upon a block of wood and kept secure by bolts, and fillets of wood.

The patentee modifies his specification by Disclaimer, but the alterations have reference to the improvements in carriages only.

[Printed, 10*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 51, p. 577.]

A.D. 1849, June 28.—Nº 12,679.

WOODS, Edward.—"Certain improvements in turntables." The inventors object is to obtain "great lightness and durability "in the framework of the tables," and the improvement consists in constructing the skeleton framework of the top or revolving part of the turntable. "A circular horizontal bearing ring of "malleable iron of convenient section," serves as an "exterior "bond for the framework," and forms the "medium through "which that part of the pressure of the revolving top, and its "superincumbent load, which is not sustained by the centre pin "or socket of the turntable, is transmitted to the rollers; the "under surface of the said ring being truly formed and other- "wise adapted to rest or traverse upon the rollers in the ordinary "manner." In order to render the ring circular and true in form, after the ends are welded up, the iron is heated red hot, and passed in that state through rollers. The surface which is to "traverse upon the rollers may be turned up true in the lathe. "The quality of the iron should be such as will permit of welding "without difficulty." Two horizontal parallel bars are laid across and upon the ring. "These are not only an essential part "of the top frame, but also consitute a line of railway across the "turntable."

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 73; Mechanics' Magazine, vol. 52, p. 19; Artizan, vol. 8, p. 40; Patent Journal, vol. 8, p. 104.]

A.D. 1849, September 6.—Nº 12,758.

MACNEILL, Sir John, and BARRY, Thomas.—"Improve- "ments in locomotive engines and in the construction of railways." The improvements so far as they relate to the subject of this series consist in "the application of metallic sleepers to the con- "struction of railways." The metallic sleepers are made of malleable iron, flexible cross bars and cast-iron plates cast to the proper angle required to make the rail stand at the suitable position for the tires of the wheels. "The joint sleepers are made "strong and large for the purpose of making the rail as near "as possible to one solid bar, and at the same time, by means of "cross tiers of maleable iron united to the cast iron, the way or "road acquires the necessary elasticity, and all the rigidness "of the *longitudinal sleeper* also. The manner of uniting the

" such rails to their bearers;" thirdly, in " constructing parts of " the permanent ways of railways by the use of transverse and " longitudinal bearers, each having cast thereon two or more " chairs;" fourthly in a turntable. "The upper or moveable " part of the turntable is formed of plates of iron rivetted to " lengths of T iron, with a circular ring of angle iron under the " outer edge or circumference, and with the exception of this " ring, and the lengths of T iron, there is no framing used, the " whole strength being obtained by the iron plates of which the " table is composed, and the trough rails are rivetted across " the plates of which the upper part of the table is formed. By " this arrangement the moveable part of the table is, with the rails " thereon, made into a circular girder or beam by rivetting or " bolting the plates together by the aid of T iron, or the plates " may be bolted to one another, and the rails are bolted to the " plates, by which it will be found that all parts contribute to the " general strength. The turntable is supported at its outer edge " by rollers, similarly to what has before been done."

[Printed, 2*s.* 2*d.* Drawings. See Repertory of Arts vol. 16 (*enlarged series*), p. 278; Mechanics' Magazine, vol. 53, p. 16; Practical Mechanics' Journal, vol. 5, p. 65; Artizan, vol. 9, p. 148; Patent Journal, vol. 9, p. 164.]

A.D. 1850, February 7.—N° 12,962.

ORMEROD, Edward, and SHEPHERD, Joseph.—" Improve- " ments in or applicable to apparatus for changing the position of " carriages on railways."

The invention relates to the traversing truck, used for changing the position of carriages on railways, by transferring them from one line to another of the rails.

The apparatus consists of an " oscillating or vibratory frame " or stage," supported on the traversing truck, and " adjustable " as occasion requires, as an inclined plane, up or down which " the carriage may be moved from or to the permanent rails, and " as a horizontal support for the carriage whilst being traversed " from one to another line of the permanent rails, with suitable " adjuncts for producing or maintaining such several adjust- " ments." There is also an arrangement and application of switch apparatus "for placing on and withdrawing from the " permanent rails of the railway, inclined planes, to be used when " *required to facilitate* the placing and removal of carriages upon

" and from traversing trucks or lorries, ordinarily used for trans- " ferring carriages from one line of rails to another."

[Printed, 1s. 6d. Drawings. See Mechanics' Magazine, vol. 53, pp. 119 and 381; Practical Mechanics' Journal, vol. 3, p. 233; Patent Journal, vol. 9, p. 223.]

A.D. 1850, April 5.—N° 13,029.

SAMUEL, James.—" Certain improvements in the construction " of railways and steam engines, and in steam engine machinery." These improvements comprise, firstly, the construction of longitudinal trough sleepers, secured by ties, and in the trough of which the rails are firmly fixed by wooden linings. The sides of the trough are serrated to hold the wood, and the trough being wedge-shaped, the greater the pressure on the rail the more securely it will be held. The flanges of the sleepers may be corrugated. Secondly, " a metallic bearing plate or chair " sleeper," the whole of which is made of one piece of metal. Thirdly, a "fish-chair," with one jaw, against which the rail is secured with a fish on its other side. Fourthly, a mode of scarf-jointing the ends of rails, for the purpose of securing them without the aid of fishes. Fifthly, bearing plates for rails to be used in lieu of sleepers. In section they represent a triangle, the two sides of which are of corrugated iron placed on a base of flat iron, the rail being at the apex, either on a flat table, or grasped between the two sides. The bearing plates are kept in gauge by ties, and the corrugations of the iron run preferably parallel with the rails.

[Printed, 4s. 8d. Drawings. See Mechanics' Magazine, vol. 53, pp. 299, 401, and 449; Artizan, vol. 9, pp. 148, 195; Patent Journal, vol. 10, p. 46.]

A.D. 1850, June 12.—N° 13,132.

NEWTON, William Edward.—(*A communication.*)—" Certain " improvements in the construction of railways."

" The use of transverse sleeper is dispensed with, and, in place " thereof, the cast-iron chair is cast on a plate of such a form " and dimensions as to resist the downward pressure of heavy " weights as well as lateral displacement by the wheels of the " carriages. In order to preserve the rails in their parallel position, and prevent the sleepers or bearing plate from being displaced sideways, the under surface of the said sleepers has cross " flanges or projecting ribs cast thereon. One of these flanges

" or ribs runs parallel with the rails, and, being sunk into the " ballast, resists any lateral pressure, while the other flange or " rib runs at right angles to the rail, and serves to give strength " and stiffness to the sleeper, and also prevents any longitudinal " displacement. In order further to secure the perfect parallelism " of the rails, the sleepers are connected traversely by wrought- " iron rods or bars, which will not have any other effect upon the " sleepers than to prevent them from moving asunder transversely, " leaving the sleepers otherwise perfectly independent of each " other; so that if one sink it may be raised and properly adjusted " without interfering with the sleeper at the opposite end of the " transverse rod or bar. It is not, however, absolutely necessary " to employ this tie rod, and therefore it may under some " circumstances be dispensed with."

The patentee also claims " dividing one of the jaws of a joint " chair into two parts, in order that the ends of the two rails may " be held or fastened separately . . . . so that if one rail should " require to be removed, this operation might be effected without " interfering with the other rail."

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 356; Mechanics' Magazine, vol. 53, p. 514; Patent Journal, vol. 10, p. 140.]

A.D. 1850, July 3.—N° 13,158.

HOBY, JAMES WARD.—" Certain improvements in the con- " struction of parts of the permanent ways of railways, and in " shaping iron."

The improvements claimed under this patent consist in a mode of " securing rails upon longitudinal or transverse bearers or " sleepers by curved or angular lips upon one side, and by means " of bolts and nuts or rivets, either passing through one of the " flanges of each of the rails, or passing between the edge of each " such flange and a projecting rib or studs, or by means of a " curved or an angular dog and bolts and nuts or rivets on " the other side of the rails;" in a mode of securing rails upon longitudinal or transverse sleepers by means of " curved or angu- " lar lips on one side, and by means of ribs or studs and keys " on the other side;" in " applying chocks along each or either " side of a line of rails, either with or without keys, for the pur- " pose of securing such rails upon longitudinal or transverse " *bearers or sleepers;*" in " constructing the troughs of longi-

" tudinal iron trough sleepers or bearers for holding and securing rails, so that one side or shoulder of each trough shall " fit and support one side of the rail placed within it, and also so " that a key or keys may be introduced within the trough on the " other side of the rail for the purpose of supporting it;" in constructing "longitudinal bearers so that a shoulder or side of " each such bearer shall fit to and support one side of each of " the rails placed upon it, the other side of each of the rails being " supported by means of chocks with or without the aid of " keys, or by means of a rib or studs and keys;" in "constructing a stretcher of tubular or hollow iron, and also a mode of " combining such a stretcher with a tie rod;" and also in "constructing railway keys of bent, curved, or other similar forms;" and also in "constructing such keys of metallic tube and wood."

[Printed, 1s. 8d. Drawings. See Mechanics' Magazine, vol. 54, p. 88; Engineers' and Architects' Journal, vol. 14, p. 64; Practical Mechanics' Journal, vol. 3, pp. 230; Artizan, vol. 9, pp. 148 and 180; Patent Journal, vol. 10, p. 174.]

A.D. 1850, July 17.—N° 13,179.

MELVILLE, John.—" Certain improvements in the construction of railways and locomotive engines and carriages."

The improvements, so far as they relate to this series of abridgments, consist in "forming a continuous longitudinal bearing " or sleeper of cast-iron tubes, of circular or elliptical section, " connected together by bolts and flanges, and having along " the upper side a rib or a channel, to which rails of wrought " iron, of certain peculiar forms, are connected in any suitable " manner."

[Printed, 10d. Drawings. See Mechanics' Magazine, vol. 54, p. 95; Engineers' and Architects' Journal, vol. 14, p. 88; Patent Journal, vol. 10, p. 191.]

A.D. 1850, August 3.—N° 13,211.

SHAW, Joseph.—" Improvements in constructing and working " certain parts of railways." "This invention consists, firstly, in " certain arrangements of apparatus for working the shunts or " moveable rails of railways," vertical or otherwise; "secondly, " in certain arrangements of apparatus for working visible and " audible signals; and, thirdly, in a means of rendering the gates " *of roads which cross railways* on a level self-acting. In all

" these several arrangements, the desired effects are or may be " attained by the locomotive engine traversing over the line."

[Printed, 3s. 8d. Drawings. See Mechanics' Magazine, vol. 54, p. 119; Patent Journal, vol. 10, p. 218.]

A.D. 1850, September 5.—N° 13,246.

COCHRANE, WILLIAM ERSKINE, and **FRANCIS**, HENRY.—" Improvements in propelling, steering, and ballasting vessels, " in the pistons of steam engines, in fire-bars of furnaces, and in " sleepers of railways." In the sleepers of railways there is a " cast-iron plate, with vertical ribs or projections cast on its " upper surface, which form a trough on the plate to receive the " longitudinal wooden sleeper, upon which the rails rests; openings are cast at intervals in the sides of the ribs to receive the " foot or angular projections on each of the jaws which are " securely retained in their position . . . . by the wooden sleeper " pressing against their inner surfaces; and the jaws are caused " to hold the rail between them by a wedge in like manner to the " ordinary railway chair; the peculiarity consisting in constructing and fixing the jaws in combination with the longitudinal " sleepers of wood."

[Printed, 1s. 6d. Drawings. See Mechanics' Magazine, vol. 54, p. 216; Engineers' and Architects' Journal, vol. 14, p. 166; Patent Journal, vol. 10, p. 258.]

A.D. 1850, November 7.—N° 13,316.

BROOMAN, RICHARD ARCHIBALD.—(*A communication.*)—"Improvements in railways;" consisting "in an improved method " of joining the different lengths of rail end to end, whereby the " upper surfaces with which the carriage wheels come in contact " are at all times kept flush one with the other, and at one uniform level." The drawings show two U-shaped or bridge rails joined together by a " coupling bar of wrought iron, which is of " the same form in cross section as the hollows on the under " side of the rails, and fits into these hollows with some degree " of tightness." This coupling bar is further secured to two rails at the two ends by rivets or screws. "The rivet holes at " one end are punched out of an oblong form to allow for the " expansion and contraction of the metal. One rail only is in " the first instance riveted to the bar, and after this has been laid " *in its place, the other* rail is rivetted up to it. The joint thus

" formed is perfectly stiff, both vertically and laterally, yet at the
" same time permits of a sufficiency of play for the expansion
" and contraction due to the difference of temperature."

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 358; Mechanics' Magazine, vol. 54, p. 396; Patent Journal, vol. 11, p. 85.]

A.D. 1850, November 19.—Nº 13,355.

DUNN, Thomas.—" Improvements in machinery and apparatus
" for moving engines and carriages from one line of rails to
" another, and for turning them; also for compressing certain
" substances, and for raising and lowering heavy bodies."

The invention consists " in placing intermediate wheels, when
" such are used, in a traversing truck, so that the peripheries of
" the wheels on the outside axes project beyond the peripheries of
" the wheels on the adjoining intermediate axes, or those next in
" line to them, whereby as the truck is passing over the flange
" gaps of the permanent way the shocks are reduced."

" In attaching inclined planes by spiral joints to a traversing
" truck, to enable a carriage to be easily passed upon it when
" required, and when the inclined planes are not in use they can
" be folded to the ends of the truck to be out of the way."

" In constructing a traversing truck so that the shelving which
" has no rail attached to it supports the carriage by the flanges
" of the wheels; and such traverser may be lowered at one end
" between the rails of the permanent way, so as to form a gentle
" inclined plane of the full length of the traverser for carriages to
" ascend, or the traverser may be wholly lowered, so as entirely
" to dispense with the necessity for inclined planes."

" In attaching a portion of what is usually called the permanent
" line of railway to a frame, and in lowering such frame with a
" traverser, upon it untill the surface of the rails of the traverser
" and those on the permanent way are on the same level, so that
" an engine or any other description of carriage may be run upon
" it without having any of the weight to lift perpendicularly to
" to enable such carriage to be traversed from one line of rails to
" another."

" In the construction of a traversing truck with low horizontal
" plates of wrought iron, supported by large external and small
" internal wheels framed together by angle iron, which forms
" *also the rail on the traverser.*"

"In a railway turntable so constructed that it requires no pit to " work in."

In the arrangement of a railway hoist for trucks and carriages, &c., in which water is used as a counterbalance and supplies the motive power, and finally in several other improvements foreign to this series.

[Printed, 3*s*. 2*d*. Drawings. See Mechanics' Magazine, vol. 54, p. 418; Patent Journal, vol. 11, p. 96.]

A.D. 1850, December 7.—N° 13,394.

HOBY, James Ward.—"Improvements in the construction of " the permanent way of railways."

Firstly, in "constructing the troughs of transverse iron trough " sleepers or bearers for holding and securing rails, so that one " side or shoulder of each trough shall fit and support one side of " the rail placed within it; and also so that the key may be intro- " duced within the trough on the other side of the rail, for the " purpose of supporting it."

"Secondly, in "constructing transverse iron bearers, so that a " shoulder or side of each such bearer shall fit to and support one " side of each of the rails placed upon it, the other side of each of " the rails being supported by means of chocks, with or without " the aid of keys, or by means of a rib and keys."

Thirdly, in connecting or combining a transverse bar with the bearers "without the aid of bolts, rivets, or keys," the notched end of the bar being attached to the bearer by a socket, and a stud engaging with the notch.

Fourthly, "constructing railway keys of two wedges, or of two " wedge-like or tapering pieces, ... so that the wedges or " pieces may be driven or act in different directions."

Fifthly, "applying a piece of wood in combination with the " aforesaid double or folding keys, when such keys are made of " iron."

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 54, p. 476; Artizan, vol. 9, p. 186; Patent Journal, vol. 11, p. 123.]

A.D. 1851, January 14.—N° 13,452.

BARLOW, Charles.—(*A communication from William Van Andem.*)—"Improvements in the machinery for the manufacture *" of railway chairs."*

"The nature of the invention consists in forming railroad chairs "from plates or flat bars of wrought iron by one operation, ... "by which a piece of plate of the required shape is first cut off, and "afterwards pressed between two dies, one of which is stationary, "and the other attached to a vertical sliding head, by which the "edges are beveled, and the holes for the spikes are punched. "Two cutters, secured to swinging arms attached to another "vertical sliding head, are then caused to cut out and form the "lips, after which the chair is thrown out in a finished state, each "revolution of the driving shafts forming a chair."

[Printed, 8*d*. Drawing. See Mechanics' Magazine, vol. 55, p. 76; Patent Journal, vol. 11, p. 203.]

A.D. 1851, February 7.—N° 13,493.

DE BERGUE, CHARLES.—"Improvements in and in the con-"struction of the permanent way of railways." The improvements consist—

Firstly, in "constructing iron longitudinal bearers or sleepers "for more effectually supporting the rails of permanent ways .... "by so disposing the metal, or disposing and combining the metals "of which they are composed as best to resist the strain to which "they are subjected by reason of the inequalities of the ground or "ballast, being chiefly tension at their lower portion or base, and "compression at their upper portion." The bearers are made in such form that their bases "shall be considerably stronger, or (if "wholly of cast iron) have a greater transverse sectional area "than their upper portions, in every case making their upper "parts of such forms as may be necessary for enabling them to "receive and support the descriptions of rails to be placed upon "them."

Secondly, in "transverse iron ties or bearers to be used in con-"junction with longitudinal bearers or sleepers. These ties are "made to have a transverse sectional form similar to the letter T "inverted so that the ends of any longitudinal bearers or sleepers "(having flat bottoms) may rest upon the tie and assist in keep-"ing the longitudinal bearers steady, and prevent them from "canting."

Thirdly, in the use of "certain forms of rails, namely, an "angular rail, made so as to fit against one side, and upon the "top of the upper part of the longitudinal bearers or sleepers; . . . . and *also a saddle* rail so formed that the interior or under

" side of the tread or working service of the rail shall rest upon " and be supported by the upper part of a longitudinal bearer or " sleeper, the sides or flaps of the rail being bent either to a right " angle with the bearing surface of the rail, or to such other " angle as may be requisite to make the rail fit upon and he held " more securely by the top of the bearer upon which it shall be " placed."

[Printed, 1*s*. 4*d*. Drawings. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 360; Mechanics' Magazine, vol. 55, p. 137; Engineers' and Architects' Journal, vol. 15, p. 198; Patent Journal, vol. 11, p. 244.]

A.D. 1851, February 10.—N° 13,500.

NORRIS, Richard Stuart.—" Certain improvements in the " construction of the permanent way of railways, bridges, locks, " and other erections wholly or in part constructed of metal, also " improvements in brakes for railway carriages." The invention relates to a " method of joining together, fastening, or sup" porting the bars of railways, various parts of iron bridges, " locks, and other erections, and consists in effecting such object " by casting molten iron or other suitable metal upon or about " the said rails or other parts intended to be joined, fastened, or " supported."

The improvements extend to a portable cupola and appendages, such as moulds to put round the rail joint, for use in such " process."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 4; Mechanics' Magazine, vol. 55, p. 139; Engineers' and Architects' Journal, vol. 16, p. 72; Artizan, vol. 2, p. 239; Patent Journal, vol. 11, p. 245. (Specification No. 13,578).]

A.D. 1851, February 17.—N° 13,514.

DE PONS, Henry François Marie.—" Certain improvements " in constructing roads and ways and pavements of streets, and " the ballast of railways." The invention consists in com" bining together certain substances and forming with them a " concrete composition," which may be used for " roads, pave" ments, streets, ways, and railways." The following substances are named as best adapted to carry out the invention :—" Iron ore " in state of stone iron reduced in small pieces ; granulated cast " iron, either broken or in chippings and shavings ; iron or other " metals reduced in pieces, or in clippings and shavings ; volcanic " *schistus, which is* called volcanic gluten, after having been

" submitted to the action of fire, and pulverised and converted " into cement; all cements, and hydraulic limes, lime, plaster, " sand, stone, iron, drosses, slags, bitumens, asphaltes, sulphur, " sulphate of alumina, or alumina and sulphate of iron.

The patentee describes nine different processes by which he combines the above-named substances, and says that the ground on which they are to be laid must be " macadamised, or so com- " pactly pressed down that it presents a perfectly solid or even " surface."

In the construction of railways under this invention the sleepers are " bedded in the composition, which surrounds and adheres to " them very strongly." Or the sleepers may be suppressed, and " stone or cast-iron chairs can alone be employed; they will be " rendered independent and placed at a distance from each other, " or they can be connected together by means of a small metallic " rod." The rails even may also be entirely suppressed, in which case the wheels will run on prepared edges, or in grooves in the composition.

[Printed, 4d. No Drawings. See Mechanics' Magazine, vol. 55, p. 158; Patent Journal, vol. 11, p. 255.]

A.D. 1851, February 27.—N° 13,535.

ELLIS, THOMAS.—" Certain improvements in machinery or ap- " paratus to be employed in the manufacture of blooms or piles " for railway and other bars or plates of iron." The improvements in the above machinery consist in a peculiar arrangement of mechanism—a combination of crank and rack—for causing the rolls through which the bloom or pile is passed " to rotate first in " one direction and then in the other, or, in other words to rotate " backwards and forwards, so as to obviate the necessity of lifting " the bloom or pile over the top of the rolls as heretofore, an " operation which is necessary in cases where the rolls are rotating " in one direction only."

[Printed, 6d. Drawing. See Mechanics' Magazine, vol. 55, p. 197; Practical Mechanics' Journal, vol. 5, p. 3; Patent Journal, vol. 11, p. 279.]

A.D. 1851, March 24.—N° 13,565.

HILL, THOMAS. — (*A communication.*) — " Improvements in " wrought iron or malleable iron railway chairs."

" This invention consists of a wrought-iron railway chair made " from a *plate of wrought iron* by machinery, which punches up

" lips therefrom of the proper form to embrace and secure the " rail."

" Chairs of this description may be divided into several classes, " the principal of which are, first, that in which the lips of the " chair are presented sideways to the rail; second, that class in " which the lips are presented edgewise thereto; and, third, that " in which one or more of the lips are presented sidewise to the " rail, while the remainder are presented edgewise thereto. All " these classes admit of almost endless modifications in their " form, size, and proportions to adapt them to rails of different " forms and dimensions, and to the circumstances of any par" ticular case."

The press and dies are also described, though they are not specifically claimed.

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 18 (*enlarged series*), p. 232; Mechanics' Magazine, vol. 55, p. 278; Engineers' and Architects' Journal, vol. 14, p. 533; Practical Mechanics' Journal, vol. 4, p. 221; Patent Journal, vol. 12, p. 11.]

A.D. 1851, April 26.—N° 13,602.

DALTON, DANIEL.—" Improvements applicable to railroads."

The invention consists in " various constructions and combina" tions of rails and longitudinal iron sleepers to be laid end to end " on the ballast so as to form in effect firm continuous iron " bearings and rails."

When the sleepers are of cast iron, for the purpose of connecting the sleepers to each other, and to the transverse tie rods, bolts and nuts are used for fastening the tie rods to the sleepers, and the sleepers longitudinarily to each other, the same bolts and nuts fulfilling both uses.

Several methods are described, to suit various types of rail, and single as well as double-jawed chairs are used.

[Printed, 10*d.* Drawings. See Repertory of Arts, vol. 19 (*enlarged series*), p. 13; London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 95; Mechanics' Magazine, vol. 55, p. 376; Patent Journal, vol. 12, p. 70.]

A.D. 1851, April 26.—N° 13,603.

HADDAN, JOHN COOPE.—" Improvements in the permanent " way of railways, in railway and other carriages, and in the " manufacture of papier maché to be used in making carriages " and other articles."

The improvement in the permanent way of railways consists " in constructing it of two forms of rails or bars of iron to be " used with each other, one of them constituting a rail and a por- " tion of the sleeper, and the other constituting the remaining " portion of the sleeper.

The two "forms" when in position, constitute two sides of a triangle, the rail head forming the apex. The base of the triangle is formed by the tie bar and is fitted with abutments to secure the two sides in position, that is, to preserve their angle.

The parts of the rail break joint with one another.

Single lengths of the rails are connected by riveting "so that " each may project about one foot beyond the other;" and the several lengths of the compound rail thus formed are connected by bolts and nuts, with the ordinary provision for expansion and contraction.

[Printed, 1s. 6d. Drawings. See Mechanics' Magazine, vol. 55, p. 377; Patent Journal, vol. 12, p. 60.]

A.D. 1851, May 19.—N° 13,637.

PARSONS, Perceval Moses.—" Improvements in cranes " capable of being used on railways and in parts of railways." With reference to the improvements in railways the patentee claims, firstly, the method of " constructing switches for railways " by fixing the main rails with the slabs or bars for the support " of the tongue rails on a wrought-iron plate extending the whole " length of the switch."

Secondly, a method of "fixing the supports for the tongue rails " on or against the main rail itself when of a suitable form."

Thirdly, a method of " constructing the main rail itself in such " a manner as to form a suitable platform or support for the " tongue rail."

Fourthly, a plan of "constructing switches for railways by fix- " ing the main rails on separate cast or wrought iron plates to " act as sleepers, such sleepers being also furnished with slabs or " bars for supporting the tongue rails."

Fifthly, " fixing the chairs with their bars for the support of the " tongue rails to the main rails of the section."

Sixthly, methods of "constructing the tongue rails of " switches."

Seventhly, a method of " constructing crossings for railways by " fixing the point and wing rails on a wrought-iron plate extend-

" ing the whole length of the crossing, and having junction chairs " attached to it at the ends."

Eighthly, "fixing the wing and point rails on separate cast or " wrought-iron sleepers."

Ninthly, a mode of "fixing chairs or saddles on or against the " wing rails to support the point rails, or by forming the wing " rails so as themselves to make a support for the point rail, or " vice versâ."

Tenthly, "forming the wing and point rails and sole plate in " one solid mass of wrought iron."

Eleventhly, methods of "fixing the point rails by wedging them " in between the wing rails, fixed on cast or wrought-iron plates " or sleepers, either extending the entire length of the crossing in " one piece or in separate pieces, whether the junction chairs are " used or not."

Twelfthly, " the method of cutting two point rails out of one " parallel bar."

And lastly, " the making or constructing wing and check rails " of the several forms and sections " described by him.

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 55, p. 437; Patent Journal, vol. 12, p. 93.]

A.D. 1851, June 3.—N° 13,653.

ADAMS, William Bridges.—" Certain improvements in the " construction of roads and ways for the transit of passengers, of " materials, and of goods; also in buildings and in bridges, and " in locomotive engines and carriages; parts of which improve- " ments are applicable to other like purposes." The patentee claims "the application to the permanent way of railways of stone " block sleepers, with bolts passed through them to hold down " the rails or chairs, or both, with or without the intervention of " timber or similar elastic material. Also the application of longi- " tudinal or transverse sleepers, secured to stone blocks by bolts " passing between the blocks, and secured to timber or other " material below the blocks. Also similar arrangements substi- " tuting masses of brickwork or cement," or other material, "in " place of stone blocks, to secure the rails firmly, and, when re- " quired elastically, to a sufficient mass of weighty ballast. Also " the use of side clamps to secure the rail ends bolted below the " rails, and forming a chair if preferred. Also the sectional form " of a deep single T-iron rail and timber combined for permanent

“ way, ... and a laterally corrugated or grooved rail. Also
“ the construction and application of various forms of rails
“ . . . . to produce lateral and vertical stiffness, formed of
“ cast or wrought metal, or of both combined or combined with
“ wood and formed of one piece or of several pieces combined, or
“ rivitted or bolted together, and laid in concrete or in ballast, or
“ with or without sleepers beneath them, and which are called
“ ‘girder rails,’ such girder rails having a continuous vertical or
“ partly vertical support lower than the horizontal or partly horizontal
“ bearing surface on the sleepers or ballast. Also the
“ application to girder rails of cheek plates and angle cheek plates,
“ on one or both sides, or tongue plates, or saddle or channel
“ plates, or girder bearers or break joint, for the purpose of connecting
“ the girder rails or parts of them together, and making
“ them continuous, and combining them in any new form required.
“ Also modes of making curved rails by forming
“ the holes of the separate horizontal plates in curved lines.
“ Also the application of hollow girders or rails as water pipes,
“ or perforated as drain pipes, and various other forms capable
“ of this arrangement, by adding bottom plates. Also the application
“ of elastic girder rails . . . . to permit elastic yielding
“ of the rail without disturbing the ballast below. Also the application
“ of longitudinal or other timber bearings beneath the
“ broad horizontal surfaces or plates of metal to give vertical
“ stiffness. Also the construction and application of channel
“ rails. Also the construction and application of steel or steeled
“ rails to form girder rails. Also the application of preservatives
“ to rails, to protect them against oxidation. Also the construction
“ and application of portable railways or agricultural or other
“ light railways or tramways. Also the notched bar with staple
“ holes, and the application of forked staples or staples and holes,
“ to connect portable or other rails and cross bars, together with
“ or without notches. Also the construction and application of
“ elastic railways, to diminish noise and vibration in streets or on
“ arches, or on buildings, particularly adapted for carrying railways
“ through towns.”

The inventor further claims the application to roads, station platforms or other open places, “or for like purposes in railway
“ sleepers of perforated surfaces of wrought iron, or cast iron, or
“ other metal, stone, glass, slate, earthenware, or other similar
“ material, supported *on legs* or ledges above the surface of the

" ground or of the ordinary pavement, so as to permit dust, mud, " or water, or other extraneous matter to pass away below, such " perforations being either 'undercut' holes, ... or openings " at the edges . . . . or longitudinal openings. Also the appli- " cation of such surfaces, or of any common grating, laid in con- " tact with sand, gravel, or other porous soil, so as to give an " unyielding yet porous surface." Also the use, in similar situations, of metal frames fitted with blocks of wood, or earthenware, &c. Also the "application of a chain tension network " and intersecting corresponding girders . . . for flat or slightly " arching roofs or floors, thus distributing the strain." Also the use of elastic cords or piping, in making water-tight joints in structures. Also the "application of glass bricks, either plain or " coloured, to building purposes." Also certain improvements in the construction of bridges, locomotives and carriages.

[Printed, 3*s*. 2*d*. Drawings. See Mechanics' Magazine, vol. 55, p. 476, Practical Mechanics' Journal, vol. 4, p. 226; and vol. 5, p. 65; Patent Journal, vol. 12, p. 183.]

A.D. 1851, October 2.—N° 13,760.

WARREN, James.—" Improvements applicable to railways and " railway carriages, and improvements in paving." The invention consists in an " improved sleeper of iron of a prismatic shape, " having cross ribs, for the purpose of giving additional strength, " and also, when used transversely, outside bridge ribs under the " rail, so as to give an increased bearing for the lower flange " of the rail; between them wood, soft metal, or other suitable " material may be interposed, if thought desirable. The sleepers " are packed underneath in the ordinary way, for which method " the form given to this invention will be found an improvement. " The sleepers are pierced with apertures of any convenient form " to admit of the escape of moisture from beneath; but where " the ends are open this arrangement may be dispensed with. " The sleepers are connected by tie rods of iron or by wooden " sleepers, or the two sleepers may be cast in one piece." Also in "improved forms of chair, by which the necessity for wooden " keys is dispensed with, which may be used with the improved " or other sleepers, and in one of which the action of the passing " traffic causes it to bend on the rail, and hold it more firmly; " also in a modification of a clip, which is used at the joints of " *the rails when the* ordinary chair is dispensed with. It is bolted

" together and holds the ends of the rail firmly together." The patentee also claims " the use of a wheel acted on by the wheels " of a train of carriages or engines, or by a sledge attached " to the last carriage, of a moveable rail opened by the same " means, and of a jointed rail depressed by the same means, " or by a cam attached to the last carriage, for the purpose of " exhibiting signals on railways." Also " the use of jointed rails " or a sliding rail, acted on by cams or rollers attached to the " engine, to open or shut the points or switches of a railway."

[Printed, 8s. 2d. Drawings. See Mechanics' Magazine, vol. 56, p. 296.]

A.D. 1851, October 9.—N° 13,765.

LILLIE, Sir JOHN SCOTT.—" Improvements in forming or " covering roads, floors, doors, and other surfaces."

The invention consists " in combining metallic substances with " coarse gravel, small pieces of stone, wood, or bricks, by means " of concrete, bituminous compounds, or other cements." Metallic bolts of a wedge-like or any other convenient shape are embedded perpendicularly in this compound material in wooden or metallic frames somewhat similar to a harrow reversed, the space between the lines or metallic rows being filled up with any of the said materials combined with cement. For railway purposes, metallic plates are laid down at each side of the rail and fastened together with transverse bolts. The intervals are then filled up as above.

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 450; Mechanics' Magazine, vol. 6, p. 318.]

A.D. 1851, October 22.—N° 13,782.

BEATTIE, JOSEPH.—" Improvements in the construction of " railways, in locomotive engines and other carriages to be used " thereon, and in the machinery by which some of the improvements are effected." The improvements consists, firstly, " in " constructing and forming compound longitudinal bearers in " two or more parts, upon or between which the rails are placed." The parts which form such compound bearers are placed on transverse or semi-transverse sleepers, " having the ends of the pieces " which compose the compound longitudinal sleeper running " past the ends of their companion pieces, and terminating on " the next or more *distant* sleeper;" by this arrangement great uniformity of bearing is obtained throughout the entire length of the permanent way; secondly, in "constructing compound rails "of three or more pieces, the two pieces which form the sides "and bottom or bearing portions to be made of common iron "rolled to peculiar sections. On and between these pieces is "placed the top or working portion of the rail, which is to be "made of the very best hard rolled iron to obtain the advantage "of greater durability in working, and . . . . when manufac-"turing the top working portion of the rail a rectangular groove "is rolled in the top surface, into which a bar of steel of a dove-"tailed transverse section is placed, and in passing the top portion "of the rail through the rolls to give it the required sectional "form the dovetailed steel bar is conjoined and retained to form "the hard working surface required. The pieces which form the "side and bottom or bearing portions of the compound rail are "made in unequal lengths, so that the end of one piece will run "past the end of its companion piece, and thereby form scarfings "with the next adjoining pieces. These pieces have holes drilled "or punched through them in such manner that their ends will "run past each other, and corresponding holes are drilled or "punched through the web on the lower part of the working or "top portion of the rail," which portion is made longer than the sides and bearing portions of the rail, and thereby reduce the number of joints on the top working surface. Thirdly, in "form-"ing a rail of three or more elementary parts, the lower portion "being divided. This rail does not require any longitudinal "timber bearings under it. These parts may be made to form "a series of scarfings with each other." The upper portion of the rail is made in longer lengths than the lower portions. "The "upper and lower parts are rolled to sections, whereby the top "portion has descending flanges which overhang the top edges "of the lower portion of rail, by which they are embraced and "the wet thrown off." Fourthly, in a railway chair so constructed as to admit wood seats beneath the rail and wooden keys for the cheeks of the rail. The base may be made large enough to rest directly on the ballast. A longitudinal bearer may similarly be provided with wooden seats. Fifthly, in "the use of longitudinal "bearers of rolled iron, which may be of various sections, to be "adapted to and combined with the ordinary double-headed rail, "known as Mr. Locke's, to form a permanent way. The rolled "*iron bearers* may be placed upon longitudinal, transverse or

" other sleepers, or they may rest wholly on the ballasting;" and, sixthly, "in the construction and application of switches or points " in such manner as to obtain greater security to the trains pass- " ing over them." The improvements here lie in the peculiar section of the moveable rails, and in the mode of securing them to the double chairs.

[Printed, 5s. 2d. Drawings. See Mechanics' Magazine, vol. 56, p. 387; Engineers' and Architects' Journal, vol. 15, p. 194.]

A.D. 1851, November 4.—N° 13,801.

ROBINSON, JOSEPH, MAY, CHARLES, and DOYNE, WILLIAM THOMAS.—" Improvements in the permanent way of railways."

The invention consists of improvements "in obtaining con- " tinuous bearing to the under surfaces of the rails on plates " of wrought iron, fixed on either side of the rails." The rails are supported by " wrought-iron plates of angle iron suitably " formed to be fastened on either side of a rail, so as to offer a " continuous bearing to the under parts of the rail; and the side " bearing plates are, in laying down a railway, to be laid on either " side of the rail, so as to break joint with each other, that is, " that the joints on each side may not come opposite to each " other. . . . . The longitudinal supporting plates offer a longi- " tudinal support to the under parts of the rail.

[Printed, 1s. 2d. Drawing. See Repertory of Arts, vol. 19 (*enlarged series*), p. 343; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 449; Mechanics' Magazine, vol. 56, p. 39.]

A.D. 1851, November 6.—N° 13,804.

DOULL, ALEXANDER.—" Certain improvements in railway con- " struction." They consist, firstly, in a method of forming the cast-iron chair. The wedge or key is secured in position " by a " screw bolt or rivet passing in the same direction as the wedge, " and passing partly through the wedge and partly through the " chair, the head of the bolt acting upon the back of the wedge, " and the nut working against the side of the chair. The wedge " is screwed into its position, and not damaged by being driven " home by successive blows of a maul." Secondly, in a system of "laying the rails on chairs composed of malleable iron and " secured to sleepers of stone, wood, or metal, by bolts or rivets;" and thirdly, in a " method of railway construction, in which inter- " mediate sleepers are employed with chairs cast in one therewith "so as to do away with bolts and keys altogether as fastenings "for the rails. . . . . The chairs are cast so that the cheeks do "not come opposite each other; but they are at such a distance "apart that when the two castings are laid obliquely in contrary "directions under the rail, the latter comes between the cheeks, "after which castings are pressed in opposite directions, until the "notches fit into each other; and when this is effected the cheeks "of the chairs will be brought in close contact with the rail, "and the interlocking of the notches will prevent the cheeks "of the chairs from releasing the rail. The tie bars, which are "necessary for the purpose of keeping the gauge, are placed at "the junction of the two sleepers or castings, and bolted to each "of them, and afford additional security that the notches will not "be disengaged from each other by the action of the railway "trains. To prevent rigidity, as also the vibration of the trains "from transmitting a destructive effect to the chairs and sleepers, "pieces of wood are placed under the rail in rectangular cavities "or receptacles about three-eighths of an inch deep, and as broad "and long as the casting will admit of, so that a small margin "may remain to confine the wood in its place while being pressed "upon by the rail."

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 56, p. 395; Practical Mechanics' Journal, vol. 5, p. 133.]

A.D. 1851, November 13.—N° 13,811.

WILLSON, Hugh Bowlsby.—(*A communication.*)—"Improvements in the construction of rails for railways." The object of this invention is "to produce a compound rail to be employed "in the construction of the permanent way of railroads, whereby "the advantages of stability and durability, which would result "from the use of a continuous bar, will be more nearly approached than by the plan hitherto adopted on railways. In "order to effect this improvement, the rails are formed in two "parts, which interlock into each other, or are prevented from "shifting from their relative position by means superadded to "those of tightening screws, or other analogous contrivances "for effecting the union of the two parts composing the rail. "These bars are provided with rebates, or otherwise furnished "with means to prevent them from moving independently of "each other, are put together in such a manner as to break joint "*(that is) the abutting* ends of the bars forming one side of the

" rail will never be in a line with the abutting ends of the bars " forming the other side of the rail. These bars are constructed " of rolled iron, and their upper edges . . . . form the bearing " surface of the rail."

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 98; Mechanics' Magazine, vol. 56, p. 415; Artizan, vol. 10, p. 198.]

A.D. 1852, January 22.—N° 13,905.

FONTAINEMOREAU, PETER ARMAND, le Comte de.—(*A communication.*)—" Certain improvements in railways and " locomotive engines, which said improvements are also applicable to every kind of transmission of motion. The invention " consists in applying the principal of the wedge acting in a " groove or channel to the construction of railways and locomotive engines, between which a greater adhesion is obtained " when required." For inclines, the wheel of the locomotive is constructed " with a groove at its circumference, made at an " angle more or less acute according to the gradient of the " road," and is made to work upon ordinary rails or upon wedge wheels. Various other modes of utilising the same principle are described.

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 57, p. 98.]

A.D. 1852, January 31.—N° 13,941.

WILLIAMS, OWEN.—(*A communication.*)—" Improvements in " preparing compositions to be used in railway and other structures in substitution of iron, wood, and stone." " To make a " composition suitable for the permanent way of railways, sleepers, " . . . . . and other structures," take " about 180 lbs. of " pitch, 4½ gallons of dead oil or creosote, 15 lbs. of raw brimstone, 18 lbs. of resin, 45 lbs. of finely powdered lime, 108 " pounds of finely powdered gypsum, 27 cubic feet of sand, " gravel, ... or other hard material, having been " passed through a half inch sieve. The sulphur is melted in a " proper boiler with about 30 lbs. of pitch, then the resin is " added and heated till the mixture boils, the remainder of the " pitch is then added, and mixed and boiled up, and then the " lime and gypsum are introduced little by little, and well mixed " up, and *brought to boil*; then the sand, gravel, ... or

" other hard material, which must be perfectly dry and have been previously heated, is to be added, and then the dead oil, the whole being constantly stirred up, well mixed and worked together, till it is sufficiently heated; it is then to be thrown into moulds of any required shape, and well pressed in, till the mould is properly filled, and when cold it is ready to be taken out of the moulds for use."

The inventor describes a method of constructing a railway with these blocks of composition. The ballast is protected by them, and the sleepers are made of the same material. The latter have channels in the direction of the rails; ballast is placed in the channels and on the top, a plank of wood to which the rails or chairs are attached.

[Printed, 6*d*. Drawings. See Repertory of Arts, vol. 21 (*enlarged series*), p. 223; London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 199; Mechanics' Magazine, vol. 57, p. 139.]

A.D. 1852, February 9.—N° 13,959.

JOHNSON, William Beckett.—" Improvements in railways, and in apparatus for generating steam." The first part of the invention relates to the construction of turntable tops of wrought iron. "The framework of the turntable top is constructed of bars of wrought iron, bent or made in the form " of sectors of a circle, "four or more of which are firmly bolted or rivetted together, the ends nearly meeting in the centre. The roller path of the turntable top is formed by bolting, rivetting, or contracting upon the outside of these bent bars when put together segments or complete circles of angle iron. The centre may be made either of wrought or cast iron, firmly bolted, rivetted, or contracted upon the ends of the framework. The elevating or centre pin may be fixed to the centre in any of the usual methods. The rails upon which the carriage is received and supported during turning, are placed on the top of this framework, and secured to it by chairs or fixings, after which the spaces between and outside the rails are fitted up with the ordinary planking secured to the framework by bolts."

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 8; Mechanics' Magazine, vol. 57, p. 158; Engineers' and Architects' Journal, vol. 15, p. 315.]

A.D. 1852, February 13.—N° 13,970.

GERVOY, Annet.—"Means to prolong the durability of the "rails on railways." The patentee says "it is found that the "wrought-iron rails of railways become crystallised and weakened "by the repeated vibrations caused by the passage of locomotive "and other carriages along with them, and their durability is "lessened as compared with those which are treated according to "my Invention, which consists of taking up the rails after they "have been in use during several years, and heating them for the "purpose of restoring or bringing them again to a fibrous and "tenacious character. And it will be evident that the time for "taking them up will depend on the quality of the iron and on "the extent of the traffic on a particular railway, all which an "engineer will be able to judge of." A furnace for this process is described.

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 96; Repertory of Arts, vol. 20 (*enlarged series*), p. 174; Mechanics' Magazine, vol. 57, p. 80; Engineers' and Architects' Journal, vol. 15, p. 207.]

A.D. 1852, February 14.—N° 13,973.

CALLEN, Arthur Wellington, and ONIONS, John.—"Certain improvements in the manufacture of certain parts of "machinery used in paper making [and in the material employed "therein, which material is also applicable to the construction of] "certain parts of railways, railway and other carriages [and other "similar and useful purposes]." The inventors propose to cast railway chairs and sleepers from hematite or malleable iron, "the "process of which is well known."

[Printed, 4d. No Drawings. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 209; Mechanics' Magazine, vol. 57, p. 178.]

A.D. 1852, March 8.—N° 14,018.

HODGE, Paul Rapsey.—(*A communication.*)—"Certain improvements in the construction of railways, and railway "carriages, parts of which are applicable to carriages on common roads." The patentee claims, firstly, the use of an electric current passed through the rails, as a preventive against oxidation.

Secondly, an "arrangement of moveable 'points' used for "crossing from *one line of rail* to another. The point which

" forms the junction of the two rails, and the two moveable " limbs which radiate on the two pins or centres, are curved at " the end for the purpose of admitting the flange of the wheel " in between the point and the moveable link, either in passing " from left to right or right to left. In order to ensure a con- " tinuous bearing for the wheel tyre while it passes from right to " left or left to right, each moveable limb is operated on and " pressed up to a point alternately by means of two buffer springs " made of india-rubber or a spiral metallic spring, ... " so that when the flange of the wheel forces off from the point " either of the moveable limbs, the opposite spring is sure to " keep the moveable limb against the point for the wheel to pass " over, ensuring a continuous tread on the rail for the wheel."

[Printed, 1*s*. 4*d*. Drawings. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 120; Mechanics' Magazine, vol. 57, pp. 259 and 462; Engineers' and Architects' Journal, vol. 15, p. 394.]

A.D. 1852, April 24.—N° 14,089.

MANSELL, RICHARD CHRISTOPHER.—" Improvements in the " construction of railways, in railway rolling stock, and in the " machinery for manufacturing the same." The first consists in making rails " of or in several new forms, combinations, and " peculiar manufacture, and so to construct them that, when " arranged and combined together, their ends or joints will be " supported." The second comprises two systems of chairs, " one being constructed on the truss principle, by tension on one " portion and compression on the other portions; the other being " composed of two parts clamping the sides of the rails, and " both descriptions being arranged for the better supporting rails " at their joints." The third relates to sleepers of two descriptions, " one of which is formed by an iron box or dish casting, " filled up with timber, to serve as a bearing and cushion for " supporting rails. The other description admits of various " modifications, and is constructed of timber in combination with " iron; the timber being arranged in a novel position by having " its grains or fibres placed vertically, or approaching thereto, and " thus presenting itself in its most incompressible position for " supporting the rails, and its strongest form for retaining them, " when said rails are inserted. This improved plan is also " is also arranged so as to support the joints of rails." The *fourth relates to* " the formation of joints at the ends of rails," and consists in "several new methods of supporting them by " means of clamps and other ironwork, some of which supports " are secured at one or both sides thereof, and others below, the " rails; some also are in combination with sleepers, and others " with tie rods and distance pieces between the rails."

[Printed, 2s. 10d. Drawings. See Mechanics' Magazine, vol. 57, p. 370.]

A.D. 1852, April 20. – Nº 14,096.

BRUFF, Peter.–"Improvements in the construction of the " permanent way of rail, tram, or other roads, and in the rolling " stock or apparatus used therefor." "It consists, firstly, of " improvements in the construction of railways, its object being " to secure, support, and strengthen the joints of the rails; and " for such purpose," a "metallic clipping or clasping, plain or " webbed" is manufactured, "as may be found most desirable " or as greater or less strength is required. Into this metal clip," which is termed "a fishing key, the ends of each rail at its junc- " tion with the preceding or succeeding rail are received, and " become securely clasped, either by the natural spring of the " metal when made to fit tight, or by a wooden key block or " wedge driven in by the side of the rails in the usual manner."

The Patentee also describes "an improved mode of laying the " sleepers or bearers and chairs on railways by the use of a longi- " tudinal sleeper laid beneath the joint (the intermediate sleepers " or bearers being laid longitudinally or transversely, as the case " may be), and placing a chair on either side the joint, instead of " immediately under it, as commonly practised." To prevent lateral displacement, the inventor cuts "a keyway laterally through " the centre of each rail end," and introduces a bolt or key with " a head on one side, fastening it on the other with a joint or key " (either with or without washers.)"

The invention further relates to the construction of "planked " roads," with or without rails or railway vehicles or common road carriages, or both. He constructs his rail or combined roads " by fixing an edge rail of any form on the outer side or extreme " verge of the ordinary or planked roadway, with a guard rail, " which may be made of timber, fixed within side the rail, to " act as guide in preventing the railway carriages from quitting " the track." To lay down the inner rail, he secures upon the ordinary or *planked road*, if on the former, upon a longitudinal sleeper, a "flat bar or dished rail, whose bearing surface shall be "raised only sufficiently to allow clearance for the flange . . . "the guard or guide rail . . . being sufficient to keep the "railway carriages upon the track."

[Printed, 8*d.* Drawing. See Mechanics' Magazine, vol. 57, p. 394; Engineers' and Architects' Journal, vol. 15, p. 426.]

A.D. 1852, April 29.—N° 14,100.

McGLASHEN, Stewart.—"The application of certain mechanical powers for lifting, removing, and preserving trees, "houses, and other bodies."

A number of spades or cutters are fixed in a frame with their edges downwards. They are driven into the earth and then, by suitable apparatus, worked with right and left handed screws or otherwise, the tops of the cutters are forced outwards, by which the earth between them is compressed. The whole is then lifted. In moving houses, a railway is shown upon which the framing carrying the house is traversed or run.

The invention is not described as being used for railway construction, though it is clearly applicable, and the abridgment therefore is inserted in the present series.

[Printed, 1*s.* Drawings. See Mechanics' Magazine, vol. 57, p. 394; Engineers' and Architects' Journal, vol. 15, p. 428.]

A.D. 1852, May 17.—N° 14,127.

NEWTON, William Edward.—(*A communication.*)—"Improvements in the construction of docks, basins, railways, and "apparatus connected therewith, for raising or removing vessels "or ships out of the water, or on to dry land for the purpose of "preserving or repairing the same."

This invention relates to an improved floating dock in connection with which is used a railway. Upon this railway the ships are drawn off the dock by means of a cradle moved by hydraulic power.

[Printed, 1*s.* 4*d.* Drawings. See Mechanics' Magazine, vol. 57, p. 435.]

A.D. 1852, June 24.—N° 14,182.

McCONNELL, James Edward.—"Improvements in steam "engines, in boilers and other vessels for containing fluids, in "*railways, and* in materials and apparatus employed therein or "connected therewith." The improvements in railways refer to the "construction of lines with continuous longitudinal sleepers "or bearings, but are also applicable for transeverse bearings. "The rails themselves have a solid or flat-sided top, or a top of "such a section that the rail may be rolled on its top and bottom "or on its foundation and wheel-bearing surfaces. This rail has "a bearing on the angular or double inclined surface of a continuous or longitudinal sleeper, which may be of triangular "section, with a flat base to rest on the ballast, whilst its angular "apex or ridge is upwards and bears the base of the rail, which is "rolled with a corresponding double incline or angular recess to "fit it;" also "the rail is rolled with small angular projections "along the bottom surface of the edges of its base flanges, in "order that it may have a better lateral hold upon the sleeper, "which is correspondingly cut out or recessed, the upper surfaces of the two inclined rail flanges being flush, or in a line "with the two upper inclines of the sleeper. The latter is in this "arrangement of rectangular section, so that it rests upon an "angular ridge similar to the rail-bearing surface, the rail being "held down upon it by bolts passed through the rail flanges, and "the timber, with nuts on the under side of the latter."

The rails are kept in guage by a tie rod "passed through each "rail, and screwed up by a nut, or the transverse tie rods may "be formed instead with an upper or lower terminal bend, for "bolting to the rail flanges, the same holding bolt serving as "well to secure the rail to its sleeper as to connect the tie rod "end." Various methods of carrying out the inventor's system are described.

[Printed, 1s. 4d. Drawings. See Mechanics' Magazine, vol. 58, p. 87; Engineers' and Architects' Journal, vol. 16, p. 118; Practical Mechanics' Journal, vol. 5, pp. 97, 107, and 175.]

A.D. 1852, June 24.—N° 14,189.

McCONOCHIE, John.—"Improvements in locomotive and "other steam engines and boilers, in railways, railway carriages, "and their appurtenances; also in machinery and apparatus for "producing part or parts of such improvements." "The improvements in railways consist, first, in so constructing a chair that "one side or jaw forms a self-acting key, and fits into the web of "the rail between the heads thereof, and wherein the rail is so "held and supported that the bottom or lower head shall not rest "upon the sole of the chair. Second, in a method of trussing, "and at the same time affording increased bearing surface to the "joints of the rails," by placing a longitudinal stringer or sleeper slightly cambered, under the ends of the transverse sleepers; and "third, in the construction of a turntable," with reference to which the inventor claims the "combination of adjustable tension "rods with two or more thicknesses of diagonal planking."

[Printed, 4*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 58, pp. 37 and 221.]

A.D. 1852, August 7.—N° 14,253.

HIND, Roger.—"Certain improvements in the construction of "machinery or apparatus applicable to weighing machines, weigh "bridges, railway turntables, cranes, and other similar apparatus."

The invention comprises "novel forms or constructions of "levers and indicators" for weighing. Also a "framing for weigh "bridges, &c., which can readily be fixed without the use of "stonework."

Also "a novel form or construction of weighing machines for "adjusting the weight upon the springs of locomotive engines, a "separate table and weighing apparatus being adapted to each "wheel of the engine, whereby the exact weight upon each wheel "can be ascertained and regulated accordingly, without altering "the position of the engine on the weighing machine." Also "the application to railway turntables of an improved steelyard "and indicating apparatus, and also an apparatus for removing "the strain or stress from the working parts of the same when "not in use, and an improved arrangement of rollers and frame "or roller race upon which the said turntables revolve."

[Printed, 3*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 58, p. 154.]

A.D. 1852, October 19.—N° 14,326.

NEWTON, Alfred Vincent.—(*A communication.*)—"An improved mode of manufacturing railway chairs." The "invention relates to the rolling of railroad chairs in continuous "lengths, which lengths are to be divided off into any suitable "lengths to form chairs, and are then to be finished in the usual "manner. . . . The iron may be piled, heated, and rolled, in "any well-known manner to a proper shape to enter the bending "*rolls.*" *After being* passed between the bending rolls it is "to

" be carried to a mandril situate between a pair of grooved rollers, " . . . . and by the action of these rollers it is caused to take " the required sectional shape."

[Printed, 6d. Drawing. See Mechanics' Magazine, vol. 58, p. 278.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—Nº 54.

RENSHAW, GEORGE PEARSON. (*Provisional protection only.*) —"Improvements in turn-tables and traverse-tables, and in the " apparatus connected therewith."

"This invention relates to a species of self-acting turn-table or " traverser for turning engines and wheeled carriages on railways. " The turntable or reversing apparatus has attached to it, or con- " nected with it, an arrangement of friction wheels or rollers, so " that when the locomotive is passed on to the table to be turned, " the driving wheels of such engine are brought into gear or " contact with the rollers or other actuating apparatus; the " engine is then put in motion, and the revolution of the driving " wheels turns the gearing, and causes the table to revolve, or " the traverser to traverse. The gearing may be disconnected " at pleasure, to allow of working the reversing apparatus by " hand. The essential object of the plan being to cause the " locomotive to turn itself, along with other vehicles (if necessary) " when placed on the reversing apparatus, the connection between " such reversing apparatus and the engine may be made in " various ways to produce the required effect."

[Printed, 4d. No Drawings.]

A.D. 1852, October 1.—Nº 57.

MACDONNELL, JOHN JOSEPH.—"Certain improvements in the construction of railways." The invention "relates to a

" metallic bearing for the rails of railways, having ribs or fillets " outside the flanches of the rails, for the purpose of keeping in " its place packing of any yielding material between the rails and " the metallic bearing, with a tongue rib or steadying piece in the " middle of the metallic bearing to fit into the hollow of the rail. " . . . . The object of the invention is, firstly, to economise " fastenings; secondly, to give greater steadiness of bearing to " the rail, by the tongue rib or steadying piece fitting into the " hollow of the rail; and thirdly, to keep the packing in its place " by means of the outside ribs or fillets."

[Printed, 8*d*. Drawings.]

A.D. 1852, October 12.—N° 357.

DAFT, THOMAS BARNABAS.—"Improvements in inland con" veyance." The invention consists in "constructing railways " of wood," in various ways, "suitable for sledges, preferring " that the width between the rails should not exceed two feet six " inches. The carriages are to be sledges suitably arranged to be " propelled by steam, and connected with a train, and are to be " made to carry at most two passengers on each seat. The under " surfaces of the carriages are to be shod with glass or other hard " substance, and provision is to be made for supplying water to " the surface of the rails. The propelling carriage is to be made " with a single wheel with projecting teeth on its periphery to " take into the open fixed rack."

[Printed, 6*d*. Drawing.]

A.D. 1852, October 16.—N° 420.

YORK, JOHN OLIVER.—" Improvements in connecting and in " fixing rails in railway chairs." " The invention consists of " substituting a cast or wrought-iron wedge piece, pin, and key " for the wooden wedge usually employed for fixing a rail in a " chair; such wedge piece also answering the purpose of 'a fish " 'piece,' now employed by some engineers."

[Printed, 8*d*. Drawing.]

A.D. 1852, October 27.—N° 542.

CARR, HENRY.—(*Provisional protection only.*)—" Certain im" provements in railways." Firstly, for an "improvement in " *making the* crossings of railways, by filling in the hollow on

" one side of the ordinary wing rail, or thickening the middle " web of the I-shaped rail so as to make it flush or nearly so with " the top and bottom flange, which filling in or thickening is " continued to the part where the wheel first takes its full bearing " on the rail, for the purpose of avoiding the splitting of the " upper flange of the wing rails when the edge of the wheels " bears upon the overhanging part."

" Secondly, for applying a similar filling in or thickening to the " rails which form the 'point' or the point rails."

" Thirdly, for forming the two middle chairs of a crossing, commonly called the B and C chairs, so that the whole of the rails " seated in each chair may be wedged up by driving in two " wooden keys for preventing the motion of the point in the " chair."

" Fourthly, for thickening the web of an ordinary switch or " stock rail of the I-form so as to support the upper flange when " the wheels bear partially on the rails."

[Printed, 6d. Drawing.]

A.D. 1852, November 6.—N° 668.

DAY, Charles Frederick, and LAYLEE, John.—The improvements consist in the use of " semi-tubular sleepers " of metal, or of " semi-tubular end bearers of cast-iron, connected by stay " bars or tie rods." Moveable rail seats are provided upon which to adjust and secure the rails.

[Printed, 10d. Drawings.]

A.D. 1852, November 8.—N° 672.

CAREY, Stephen.—" Certain improvements in the construction " of viaducts, arches, bridges, and other buildings upon a non-" expansion principle."

The " invention consists in the peculiar formation of bridges, " viaducts, arches, foundations, floors, roofs, girders, sleepers, " sea or river walls, light-houses or forts, bottoms of docks, and " all or every part or parts of any construction or construc-" tions to which the same can or may be applied, by means of " blocks, castings, plates, or other substances, moulded or formed " geometrically upon a non-expansion principle." A casting is made of iron or other suitable material, " having its sides, ends, " and *shoulders convex, and being* drilled with one or more

" holes or slots, or having lugs and appertures to receive " the same as required for bolting or more perfectly securing " the blocks or castings to each other." Each casting is dovetailed to the other, and each therefore " acts as a truss support, or binder " to the other," and thus the workmen are enabled to proceed in the " construction of any work to which the same is applicable " without the aid of any supplementary erections." Some castings are " formed with an oval or other shaped figure, as may be " best adapted for the purpose, to allow the passage of gas, " water, and other pipes to pass through the structure longitudinally, and which may likewise, if required, be carried transversely through the blocks or castings in the same manner as " through the ends thereof."

[Printed, 10*d*. Drawings.]

A.D. 1852, November 8.—N° 675.

CROWLEY, Jonathan Sparrow.—(*Provisional protection only.*)—" Improvements in the means of or apparatus for working the signals and switches on railways." "The invention " consists in working the signals on railways by means of the " flanges of the wheels of any carriage that is allowed to run " thereon. The flange of the wheels will, in passing along the " rail come against and act on a lever which is in connection " with the signal apparatus. This signal apparatus is of the " ordinary construction, and the signal of ' caution ' is always kept " up by means of an electro-magnet, which will hold down the " lever that works the same, but immediately a carriage passes " along the line, and allows the flange of the wheel to strike " the first-mentioned lever, the electric circuit is broken, and the " power of the electro-magnet being thereby destroyed, the signal " lever will be released and the signal of danger will immediately " be brought up by a weight, and will remain up until the " circuit is again completed and the signal lever is again brought " down and held in its place by the electro-magnet. Instead of " causing the breaking of the electric circuit to work merely a " visible signal, the apparatus may be made to act on a bell or " other audible signal at the station or other part of the line.

A somewat similar method of working switches is described. The switches are held in position by an electro-magnet, and the *current* is arrested by the action of a passing wheel.

[Printed, 4d. No Drawings.]

A.D. 1852, November 9.—N° 684.

DUNN, THOMAS, and WATTS, WILLIAM, junior.—" Improve-" ments in the construction of railways."

" The invention consists, first, in constructing railway sleepers " with holes or with pipes through which the wet and moisture " from the surrounding ballast is carried off, thereby keeping the " ballast in a fit state for supporting the sleepers and diminishing " of cost of maintaining the permanent way of railways. And " secondly, in constructing cast-iron sleepers of certain improved " forms, so that the contraction of the metal shall be equal distri-" buted, and that the sleeper when laid on the ballast shall be less " rigid than the cast metal sleepers generally used."

" The drain pipe is conveyed into a gutter or side drain running " between or alongside the lines of rails. These improved sleepers " are intended to be placed about three feet asunder, from centre " to centre, in the same way as some of the cast-iron sleepers " now known and in use, and the distance between the rails is " maintained uniform in the ordinary manner by tie rods. The " sleeper is particularly adapted for marshy ground, as the inverted " cone is furnished with a screw, by which the sleeper takes firm " hold of the ground."

[Printed, 8*d*. Drawing.]

A.D. 1852, November 13.—N° 742.

GREAVES, HUGH.—" Improvements in the permanent way of " railways," namely, " first, an improved mode of forming the " junction of the rails in permanent ways whereby they are ren-" dered firm and secure; second to an improved construction of " joint chair; third, to an improved construction of rail for use " on inclines and other places where great wear and tear occurs; " and fourth, to an improved mode of supporting the rails at the " points or crossings of the line."

The first improvement consists in a system of " supporting the " joints of rails by a malleable iron girder or support, which " support may consist of a piece of rail."

The inventor makes use of railway chairs with three heads, and also of "compound joint chairs."

" Shallow bridged rails rivetted together may be employed as a " permanent way, the hollow space inside being filled with wood."

or left open for the insertion of signal or other wires. "Rails of "any section may be employed for retaining the main rails in "their proper places when 'points' or crossings occur."

[Printed, 8*d*. Drawing.]

A.D. 1852, November 19.—N° 792.

DE BERGUE, Charles.—(*Provisional protection only.*)—"Im-"provements in the permanent way of railways." "This inven-"tion consists of using longitudinal sleepers or bearers of square "timber, one angle being downwards in the earth and the other "angle upwards and covered with a trough rail fixed by screws "or otherwise. The joints of the rails may be formed by any "convenient means, but it is preferred to employ a bent plate of "metal let into the wood sleeper to receive the ends of two rails, "and then, by bolts passing through the rails, the bent plate, "and the sleeper, to secure the rails, by which means a large "extent of bearing surface of the wood rests in the earth, and the "wood is used in its strongest direction, and the bent or inverted "trough rail combined therewith may be comparatively light, and "the guage between the wood sleepers or bearers may be pre-"served in any convenient manner; it is preferred to do so by "screw bolts and nuts, and also by transverse timbers notched "out to receive the inner horizontal angles of the longitudinal "bearers or sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 27.—N° 894.

CURTIS, William Joseph.—"Certain improvements in the "formation of tramroads or railroads, and carriages that run "thereon." "The trams or rails forming the railway may be "made out of the rough trees of the forest. In this instance "the smaller end of one tree rests upon the butt end of the one "before it, the butt being notched down to receive it; the trees "are buried or sunk in the ground, leaving about one and a "half inches of the upper side above the ground, and the knobs "or irregular parts being taken off with the adze or other tool, "or a slab cut off, so as to make the upper surface straight. . . . "Sometimes the trees are laid side by side," breaking joint, the upper side being made straight; "also in some cases flat planks,

" scantling, round poles, or small trees are used for temporary " purposes, such as for getting off a crop from soft land, for " getting timber out of forests, or other purposes, in which case " the timber is simply laid upon the ground; and in some cases " a stake or peg is driven into the ground by the side of the " timber to keep it in its place whilst the load passes over it. In " cases in which small trees are used as a permanent railway it " may be necessary to supply cross sleepers, in which case the " better mode will be to notch out the butt or larger end of the " rough sleeper, and to lay the sleepers, the large and small ends " alternately. The trams will be thus perfectly sustained both " vertically and horizontally." Iron rails are also used, "which " may be the same as those usually employed in ordinary railways," or may be a flat bar bevilled off at the edges, " or other " suitable shape." When a flat rail with a bevilled edge "is " used, then the bevilled edge of the wheel may be reduced in " breadth; the upper surface of the iron rail may be an inch, " more or less, above the surface of the ground."

[Printed, 10*d*. Drawings.]

A.D. 1852, December 3.—N° 946.

WARE, GEORGE, and **FERNANDEZ**, ALBERT HENRY.—(*Provisional protection only.*)—" Improvements in the making of " wedges or keys for holding or tightening the rails within railway chairs." The invention consists in " covering a material " or materials with heated gutta percha, so as to produce one " united mass in a wedge form shape, which material or materials " to be so covered consists either of wood inclosed within roofing " or asphalted felt, or sand and ashes, or hemp and ashes, or " cork cuttings alone, mixed with heated tar, so as to form a substance to be afterwards covered with gutta percha, as before " described."

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 7.—N° 987.

NEWTON, ALFRED VINCENT. — (*A communication.*) — " An " improved mode of transportation, for the conveyance of letters, " packages, freight, or passengers from one place to another." The improvements consist in the " method of transporting freight " and passengers through air-tight cylinders, the pressure of the " atmosphere behind a moveable plunger being used to propel

" the load, the air in advance of the plunger being exhausted. " By means of these improvements, letters, packages, and even " more bulky articles of freight and passengers, may be transmitted from one part of the country to another at a speed far " surpassing that which has heretofore been attained by any " known method of transportation, and at a materially diminished " cost. The plunger and cars may be fitted with wheels or friction slides, if desired, and made of wood or other light substance, so as to prevent friction." The details of the invention chiefly relate to the " station boxes," " check plate," " turntable," and " plunger."

[Printed, 1*s*. Drawings.]

A.D. 1852, December 14.—N° 1048.

BELL, James.—" Improvements in railway chairs."

The patentee constructs " a compound railway chair (cast or " made in one piece) having the form of two ordinary railway " chairs connected by an intermediate portion of such a form as " to fit to and support the bottom and also both sides of the rail " or rails placed within it. This compound chair is more particularly applicable as a joint chair, and, when so used, the ends " of the two rails are slipped through the chairs into the hollow " part of the intermediate portion;" and, second, " when used as " a chair for supporting a rail at any other part than at the end, " the rail may be passed entirely through the chair to the extent " which may be requisite. The rail or rails supported by the " chair are secured by keys, or otherwise, in the usual manner " within the jaws at each end of the compound chair. The joint " (if any) being in or near to the centre of the intermediate portion, the ends of the rails will be so confined and supported " that they cannot be easily displaced."

[Printed, 6*d*. Drawing.]

A.D. 1852, December 14.—N° 1052.

IRLAM, William.—" Improvements in railways."

The improvements relate, " firstly, to the construction of turntables, the points of novelty thereof consisting in placing the " rollers upon which the apparatus runs within brackets or supports attached to, or formed upon, the metal parts of the table, " which rollers travel therewith upon rails situate below; also in " *the adaptation* of a . . . . screw apparatus which, when "desired, may be brought into operation so as to lift the table from a solid bearing upon which it rests in order to facilitate its being turned. Another point of novelty consists in a method of constructing turn-tables of wrought iron;" this is effected "by placing bars crosswise to each other, and uniting them by angle pieces, or otherwise, which bars are not supported by the usual continuous circular rail."

Secondly, to "a method of causing switches to return to a determined position;" this is effected "by means of a spring instead of employing the levers and weights commonly used for the purpose."

[Printed, *8d.* Drawing.]

A.D. 1862, December 15. Nº 1071.

DUNN, Thomas, GREAVES, Hugh, and WATTS, William, Jun.—"Improvements in machinery and apparatus for altering the position of engines and carriages on railways."

The invention consists:—

"First, in improvements applicable to the machinery known as low shelved railway traversers, whereby the points or inclined planes up which the engines or carriages ascend are made self-acting and self-retaining. Secondly, in improved combinations of machinery to be used in place of railway turntables, whereby the engine or carriage to be turned is raised by hydraulic pressure, or by mechanical agents acting on a swivel frame by which the engine or carriage to be turned is elevated by the flanges of its wheels. Thirdly, in improved combinations of machinery to be used for moving railway engines or carriages laterally from one line of rails to another, or for turning them by means of bearing bars elevated by hydraulic pressure or other power acting on the axis of the engine or carriage to be moved. Fourthly, in improved combinations of machinery to be used in place of railway turntables, whereby the engines or carriages to be turned are elevated by bearing bars acting on the axles, the said bearing bars being put in operation by hydraulic pressure or by mechanical agents. Fifthly, in an improved combination of machinery for moving engines or carriages from one line of rails to another, consisting principally of a truck or lurry or low shelved traverser which vibrates from a fixed centre; and, lastly, in an improved swivel turntable,

" particularly applicable for moving engines and tenders where
" there is not sufficient space for a turntable of the ordinary con-
" struction."

[Printed, 1*s*. Drawings.]

1853.

A.D. 1853, January 5.—N° 25.

WHITWORTH, Charles Frederick.—" Improvements in
" apparatus to be used in connection with railway signals for the
" purpose of indicating the approach of trains and of preventing
" collisions."

" One part of the invention consists in the arrangement of
" apparatus to be acted upon by one of the wheels of an approaching
" carriage or train of carriages, by which the removal of a
" stop or catch will release a weight in connection with the signal,
" and the signal will be caused to indicate danger."

The second part relates to the application of stops in connection with the apparatus for working points at crossings or sidings to prevent their being opened except when the signals guarding such points are placed to indicate danger.

Finally the inventor claims " the application of apparatus with
" stops in connection with 'siding stops' or 'blocks' to prevent
" such 'stops' or 'blocks' being turned off the rail except
" when the signals guarding the siding be duly set."

[Printed, 1*s*. Drawings.]

A.D. 1853, January 6.—N° 39.

NEWTON, William Edward.—(*A communication.*)—" Improvements
" in the construction of bearings or steps for shafts,
" turntables, or moveable platforms, which invention he denominates
" 'Parry's improvements.' " The invention consists in the
employment of " a series of rollers made in the form of double
" frustrums of cones united at their bases and adapted to run in
" grooves of nearly corresponding form made in the surfaces
" between which they are interposed."

"The inner frustrums of the rollers, and the corresponding
" *parts of the surfaces* of the grooves between which they are

" interposed, are made on bevels proportioned to the diameter of
" the rollers, and the grooves in which they run such as would
" represent the pitch lines of bevel cog-wheels of the same pro-
" portions. This will ensure the rolling of the rollers about a
" common centre without slip; and to prevent the said rollers
" from being wedged outwards, or forced out of their proper
" paths, the outer ends of the rollers are made of reversed frus-
" trums with the surface of the grooves of nearly a corresponding
" bevel, so that when the rollers are in place between the two
" surfaces, they (the surfaces) shall be in contact with the inner
" frustrums of the rollers throughout their length; but the said
" surfaces, instead of being in contact with the outer frustrums,
" deviate a little from it; by which combination the rollers are
" prevented from being forced out of their true path, and hence
" will roll around and bear the weight on the surface of the inner
" frustrums, thus avoiding the practical objections to the methods
" heretofore tried."

[Printed *6d.* Drawing.]

A.D. 1853, January 7.—N° 44.

DE BERGUE, Charles. " Improvements in the permanent
" way of railways." "The invention relates to permanent way
" formed of cast-iron chairs and flat bottom or bridge rails and
" wood sleepers, and its nature consists –

" Firstly, in making the chairs with holding clips or snuggs so
" formed and placed upon them as to take hold of or clip both
" sides of the lower part or bottom flange of the rail when the
" ends of the chairs are horizontally moved or shifted in oppo-
" site directions, or when one end only is horizontally moved or
" shifted."

" Secondly, in forming such chairs with shoulders or recesses
" perpendicular or nearly so, to form bearings for the keys for
" fastening the rail in the chair."

" Thirdly, in fastening the rail in such chairs by means of keys
" driven perpendicularly or nearly so, and so as not only to
" fasten the rail in the chair, but to be held by the sleeper which
" carries the chair."

" Fourthly, in casting chairs with one clip or snugg at one end,
" and a shoulder at the other, and securing the rail to the same
" (the chair) by means of separate adjustable clip or holding

" piece, and by one or more bolts and nuts, which fasten the " chair rail and adjustable clip firmly together."

[Printed, 8*d.* Drawing.]

A.D. 1853, January 7.—N° 48.

STEWART, George.—" Improvements in railways, and in the " propulsion of engines, carriages, and other vehicles thereon." The invention relates " to the so arranging the rails of railways, " and the wheels of the locomotive engines and carriages at " work thereon, that such rolling stock may be taken up and " down inclined with greater safety and security than at present, " whilst superior facilities are afforded for stopping the movement of such rolling vehicles at pleasure, and for enabling the " locomotive to start with a train without serious risk of slipping " on the rails."

" These several ends " are accomplished " by indenting or forming teeth on the flanges of the engine or carriage wheels for " gearing with similar teeth or indentations on racks, either laid " alongside the permanent rails or forming part of such rails. " Such teeth may be of various shapes and sizes to suit the varying gradients of the line and shapes and sizes of the bearing " rails and wheels."

[Printed, 8*d.* Drawing.]

A.D. 1853, January 17.—N° 112.

YORSTON, Alexander.—(*Provisional protection only*).—" Improvements in the construction and arrangements of parts of " railways." The invention " relates to the construction and " arrangement of the points or switches of railways (as used " for directing the passage of the trains) in conjunction with " a signal apparatus in such manner that these railway details " shall work much more safely and satisfactorily than at present. A short shaft is laid beneath the line of rails in a horizontal direction and at right angles to the line of points or " switches. This shaft is capable of traversing in suitables guides, " and at each line of shifting rail it has a pair of lugs or projections standing up one on each side of the rail, so as to hold the " siding rail and switch rail from opening on the passage of a " train. One projecting end of this shaft has upon it a curved " lever carrying at its upper end a signal disc, which answers at

" the same time as a weight to keep the shaft so set that its lugs
" will always be vertical to retain the rails, this effect being
" accomplished by the bearing of the weight over to one side in
" consequence of the bend near the lower end of the lever. A
" lamp may also be attached in this disc lever. By this arrangement, whenever this lever stands upright, the lugs take up a
" similar position and hold the rails, so that the points cannot
" possibly spring, neither can the signal lever be elevated to indicate 'safety' or closed points when the points are open or partially open, as the inside lug is left long enough to catch the
" under side of the rail under such circumstances, and thus hold
" the shaft from turning and the lever from being raised. Hence
" the engine driver always knows how the points are when at a
" considerable distance from them, and he is independent of chance
" mis-setting of the points by an attendant."

[Printed, 4*d*. No Drawings.]

A.D. 1853, January 21.—N° 158.

CURTIS, William Joseph.—" Excavating or digging earth,
" and for carrying and delivering the soil."

The principle of the machine suitable for excavating a railway, consists " in a series of picks like stampers breaking up the soil,
" and a train of buckets following, lifting up the loose earth, discharges it into a series of buckets, trays, or waggons working
" horizontally or at an angle, by which the excavated soil is carried
" to embankment, or discharged at any convenient point." " Any
" number of picks may be employed to cover any width of cut, and
" the buckets are so arranged that they take the ground and
" discharge in succession."

Machinery, employing picks and shovels and soil delivery apparatus worked by steam, is also to be used for making " trenches
" or drains and for making roads."

Land may also be excavated " by means of a plough, in
" combination with the apparatus for delivering the soil."

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1853, January 31.—N° 247.

PERKES, Samuel.—" Improvements in the mode of constructing certain works applicable to aqueducts, viaducts, railways,
" *canals, rivers, docks,* harbours, lighthouses, breakwaters, reser-

" voirs, tunnels, sea walls, embankments, submarine foundations, " and other useful purposes."

Part of the invention consists in " a peculiar mode of constructing " timber bridges for roadways, &c., which " is effected by means of " combining together a quantity of boards or thin planks edge- " ways in a vertical position. The first thickness of such boards " or planks consists " of what are termed " bearers, being plain " boards on their edges set one over the other of any required " depth, according to the span or opening and the supposed " weight such structure will be required to carry, and such boards " to have their joints broken all through as far as possible. The " second row or thickness " of boards are termed binders, and are secured " to the first row at an angle of about forty-five " degrees, the third row (*videlicet*) bearers are arranged similar " to No. 1 row, only as far as possible break joint with them; " No. 4 row (*videlicet*) binders " are fixed " also at an angle of " about forty-five degrees, but in the opposite direction to the " angular binders in No. 2 row; and so continue on with as many " thicknesses as may be required, either to construct the bridge, " &c., in one solid mass the whole width of such bridge, or in " separate beams for supporting a platform of flooring on joists " upon them." The next part of the invention consists " of " forming beams or bearers for any required purpose upon the " same principle as above named, only using plates of wrought " iron, either galvanised or otherwise, instead of wood, as afore- " said, in two or more thicknesses set edgeways quite close upon " each other, and laminated, so that the fibres of the iron may " cross in any required direction, and well secured together by " rivets, or screw bolts and nuts." Then follows a description of a " novel mode of forming arches for bridges in cast iron " instead of ordinary stone work, and for which hollow iron cais- " sons " are substituted " either in a transverse horizontal direc- " tion, in the form of radial blocks, all pertaining to their centre " or centres respectively, or else vertically with similar radiating " tendencies, and the whole of which " are constructed " either " with plain exterior surfaces or with projecting ribs or lugs and " grooves, or mortices or dovetails, in order to affording stops or " catches for the purpose of preventing any slip of either of such " blocks from the ring of arch, as is frequently the case with " heavy stone arches; and where required," it is further secured " *by means of* screwed bolts and nuts, or cotter pins, rivets, or

" catches through each other, and which can be secured by means " of hollows through them."

"The next part consists of a novel mode of constructing traffic-" ways for crossing over railways, canals, and such like places, " or dangerous crossings in very crowded thoroughfares, &c., by " means of light framing" which is formed "into ribs of any " arched curve, or nearly flat" on inventor's, the laminated diagonal principle, "either of iron or wood, or combined, and of " open work when required, and employ therewith suitable angle " or T iron to afford stability and rigidity."

The patentee also proposes to construct subaqueous ways by sinking iron tubes and constructing the road through them.

[Printed, 8*d*. No Drawings.]

A.D. 1853, January 31.—N° 267.

HADLEY, CHARLES.—" Improvements in the construction and " formation of granite and stone pavements and surfaces for " carriage and railways."

The invention in the first part " is to be carried out by forming " separate blocks of granite or wood into solid plates or clocks, " of any size, depth, shape or areal section, by the introduction " and application of metal plates, frames, or boxes, the edges or " jointing of which are to be grooved or dovetailed, or of an " angular, semi-circular, square, or any other form or section, " or on the stud and plate principle; the foundations of the " road being made solid previous to the plates, frames, boxes, " or blocks being laid thereon in gravel or suitable concrete.

"The second part refers to the application of the blocks of " pavement as or in lieu of sleepers for rails, and in some cases " forming the permanent way or rails for railways; and also to " an improved form and arrangement of rails or grooves, whereby " curves of considerably less radius may be made and used upon " rail and tram roads and ways, and also for the facility of laying " down and using railways in or along ordinary (and zig-zag " streets) and roads."

Various modes of attaching the rails to the blocks are described, as well as modifications of the system itself. Safety bars for short curves, and junction rails or points, are also included.

It is also proposed " to employ the improved rails or grooves in " a *triangular or tricurved form* (*i. e.*) three segments of a radius,

" or two segments only branching from and attached to the
" ordinary line of rails for the purpose of turning or reversing
" engines and carriages or trains of carriages thereon in lieu of
" the ordinary turn-tables."

[Printed, 10*d*. Drawings.]

A.D. 1853, February 1.—N° 270.

CLARKSON, Thomas Charles.—(*Provisional protection only.*)
—" Improvements in giving elasticity to certain structures and
" parts thereof."

The patentee says—

" In stone I cut or otherwise make a hole of sufficient size to
" admit of my elastic material and chair for a railway sleeper,
" which removes the present wear and tear, and the injurious
" effect from vibration. In my concrete or cement sleeper I
" mould it to the required shape and size, at the same time
" leaving a hole for the reception of my elastic bed and chair; the
" flange on my chair prevents the possibility of its moving from
" its proper position. This sleeper will greatly economise the
" present heavy expenditure, also prevent the danger now existing
" on the present plan of the rails. The elastic material in combination
" for sea walls, fortification, common roadways, and beds
" for iron girders, will remove the present evil, which vibration
" and force now so ruinously acts.

[Printed, 6*d*. Drawing.]

A.D. 1853, February 7.—N° 330.

ROMAINE, William.—" Improvements in rendering wood
" more durable and uninflammable."

" The invention consists of a new mode or process of treating
" and preparing wood, whereby it is rendered as durable as
" stone, and retains its tenacity for a greater length of time
" than wood as hitherto prepared, and may also be rendered
" uninflammable."

Lime and tar, or cement, or lute are used for the purpose, the latter two for rendering uninflammable.

" This mode of treating and preparing wood is particularly
" adapted for railway sleepers, piles for dock work, and other
" similar works."

[Printed, 4d. No Drawings.]

A.D. 1853, February 17.—N° 412.

ADAMS, William Bridges.—“ Improvements in railways.”
The patentee says, “ Whereas the mechanical efficiency of the per-
“ manent way of railways requires that the rails be strong,
“ vertically and horizontally, to resist vertical pressure and lateral
“ shocks, and prevent deflection, and that the upper surface of the
“ rails should be kept as low as practicable on the sleepers to
“ diminish unsteadiness, and that the accurate distance or guage
“ between the rails should be maintained, and that the rails should
“ bear on such a surface as will not tend to damage them by blows
“ or percussions of the wheels, and will be of sufficient area to
“ sustain them; and that the joints of the rails should be so firm
“ as to make them resemble as nearly as possible a continuous bar
“ or bars, with the wearing surface as hard and solid as may be
“ practicable. My invention in its various parts is calculated to
“ effect these objects, and the parts of the invention may be used
“ separately or in combination, that is to say, the better securing
“ the guage of rails on railways; the lowering the total height
“ of the rails above the sleepers, the rails being secured either
“ in metal or timber chairs or beds, and efficiently connected by
“ fastenings at the joints, and the rails being in one or more parts
“ and hardened, if required, on the surface; giving greater depth
“ to the rails to prevent deflection; and lowering the rails by
“ making central steps in the chairs, and bedding such chairs by
“ grooving them in the sleepers to the guage of way, or by using
“ metallic or timber brackets instead of chairs, or longitudinal
“ timbers bolted laterally to the rails bedded into cross sleepers:
“ and also machines to prepare the timbers.”

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1853, February 17.—N° 413.

MURPHY, James.—“ Improvements in the permanent way of
“ railways.”

The invention consists of “ certain appliances of improved cast
“ or wrought iron bearings for supporting all kinds of rails for
“ railways. The rails and bearings or appliances are to be laid
“ on or in the ballast of the roadway, and not dependent upon
“ what are ordinarily termed sleepers for their support, or foun-
“ *dation.*”

Each chair forms, in fact, a separate sleeper, and the guage is preserved by the use of tie bars.

[Printed, 10*d*. Drawings.]

A.D. 1853, March 16.—N° 651.

WILD, Charles Heard.—" Improvements in fishes and fish " joints for connecting the rails of railways."

The patentee claims—

" Firstly, the constructing fishes for connecting the rails of " railways with a groove adapted for receiving the heads of the " bolts or rivets employed for securing such fishes, and the appli- " cation of such fishes for connecting the rails of railways."

" Secondly, the constructing fish joints for connecting the rails " of railways by means of fishes applied to the joints of divided or " split rails."

" Thirdly, the constructing fish joints for connecting the rails " of railways with fishes, secured by three or more bolts and nuts, " or rivets, of which the central bolt or bolts, or rivet or rivets, is " or are of greater diameter than the extreme ones."

" Fourthly, the constructing fish joints for connecting the rails " of railways with grooved fishes fitted to the sides of the rails " and secured to them by bolts and nuts or rivets, and having " projecting wings firmly secured to and resting upon the sleepers " or bearers so as to support the rails by their sides and upper " flanges," forming, in fact, a divided chair and fish combined.

" Fifthly, the constructing fish joints for connecting the rails of " railways with rails and fishes having the touching surfaces of " one or both of them planed."

The patentee uses rotary cutters for planing up the rails and fishes to make a good joint.

[Printed, 1*s*. Drawings.]

A.D. 1853, March 22.—N° 701.

JOHNSON, William.—(*A communication.*)—" Improvements " in rolling and shaping malleable metals."

The invention " relates to a novel system of rolling or shaping " various malleable metals, and bears more especially upon the " manufacture of wrought iron into railway wheels and wheel " tyres, railway bars, cylinder and valve covers, boiler ends or " *heads as well as flat* plates, discs and cones." A set of rolls radiating from a centre is used in combination with vertical rolls acting on the outside or rim of the tyre being rolled. " This invention is applicable to the construction of articles of " rectilinear form, such as rails or angle iron. In this case the " rail, for example, is first formed as a ring by means of machi" nery similar to that herein-before described, after which it is " cut open at one side, and then straightened by passing through " rollers or otherwise."

[Printed, 6d. Drawing.]

A.D. 1853, March 29.—N° 755.

PYM, JOHN.—"Improvements in the permanent way of rail" ways."

The patentee says, " I construct my sleepers (which are transverse " sleepers) of earthenware, slate, stone, or other suitable materials; " and of whatever material they may be made, I form them " hollow, instead of solid as heretofore; and in order to prevent " what is termed sopping, I perforate the bottom or sides, to " allow the water to enter the interior chamber thereof, and to " run off at either end. To fix the chairs upon the sleepers where " not desirable or practicable to adopt the methods now in use, I " form the sole of the chair sufficiently long to overlap the sides " or edges of the sleeper, and secure the ends of the sole by pass" ing a bolt from side to side, through the sleeper, and fastening " the same by a nut, pin, or rivet."

"To prevent the jarring of the chair and sleeper I place wood, " felt, or other suitable material, between the chair and the " sleeper."

[Printed, 4d. No Drawings.]

A.D. 1853, April 4.—N° 804.

MAY, CHARLES.—"Improvements in machinery for manufac" turing and rolling iron."

"This invention consists of improved machinery for rolling " iron," and consists in "an arrangement by which the rollers " are driven alternately in opposite directions, and that, without " any reversing of the machinery; the pile or rail may be passed " backward and forward through the rolls, and be elongated " in both directions without the necessity of lifting it over the " roll, as *required in mills of* the ordinary construction." The patentee also arranges a "series of pairs of rollers, placed at a " distance apart, in such manner that the iron may not be between " two pairs of rolls at the same time, yet that the succeeding " pairs of rolls be so near as to receive the iron immediately it has " quitted the preceding pair of rolls."

He also proposes to do away with the usual heavy fly-wheel, and to this end he employs two pairs of engines, which act on one central wheel.

[Printed, 6*d*. Drawings.]

A.D. 1853, April 8.—N° 846.

MOSELEY, WILLIAM.—" A new method of railway traction, to " be called a pony railway."

The invention "has reference more particularly to lines of rail- " ways the limits of whose length are such as will enable the " carriages or trains running thereon (where a single line of rails " is employed) to make the journey to the terminus opposite to " the one started from and back again in as short a time as the " interval between the starting of the trains. In carrying out the " system two or more tubes" are employed, known as atmo- " spheric tubes, laid parallel to and between the rails, for the " purpose of supplying traction power to the carriage or carriages " composing the train, one such tube being in course of exhaustion " whilst the other is employed in the propulsion of the train, so " that on its arrival at the termination of the line it may be set in " motion on the back journey without being turned round or re- " moved from the rails, the connections of the carriages with the " tubes having been previously shifted from the tube just used to " the one which in the meantime has been exhausted. . . . . On " shifting the "connection' from one tube to another, the con- " necting rod is raised by a screw or lever from the socket; it is " then moved by a second screw or by a sliding bar and blocks, " or by a lever or levers, to a position immediately over the similar " socket of the coulter of the piston in the tube by the atmo- " spheric pressure in which it is desired that the carriage should " be propelled. The connecting rod is then lowered or dropped " into this socket, and secured therein; the carriage is then ready " to be propelled in the opposite direction, without being turned " or removed from its position on the rails."

" Where intermediate stations are necessary, two other separate " *lines of tubes* are laid down for the traffic of each of such

" intermediate stations; these tubes are continued to the terminus " in either direction from the station. The carriages or trucks " for conveying passengers, goods, &c. to these intermediate " stations, run upon the same rails as the through carriages, " and are arranged in the same serial order as the stations at " which they are to be dropped. For the purpose of expediting " the taking up and setting down of passengers, &c., the car- " riages are liberated from the train, at their respective stations " without impeding the progress of the general line of carriages," and details of the method employed in effecting this liberation are given by the patentee.

[Printed, 4*d*. No Drawings.]

A.D. 1853, April 21.—N° 962.

CARR, HENRY.—" Certain improvements in the construction of " railways." The improvements consist—

Firstly, " in forming the inner part of the wing rails of railway " crossings solid, instead of with an overhanging flange, as in " the ordinary crossing of I-formed rails," with " a filling piece " between the upper and lower inner flanges. This filling piece " prevents the splitting or shearing of the upper flange of the " rail, where the edge of the wheel bears upon the overhanging " part; it may be welded to the rail, or the rail may be rolled, or " otherwise constructed of the sectional form of the ordinary " I-rail and filling piece combined. The filling piece is continued " to the part of the rail where the wheel first takes its bearing, or " as far as it is found to be necessary."

Secondly, in strengthening the middle and overhanging flanges " of the point or point rails, by the introduction of the filling " piece above described."

" Thirdly, in constructing the two middle chairs of a railway " crossing (commonly called the B and C chairs) in such manner " that the whole of the rails, when placed in each chair, shall " be wedged up by driving in two wooden keys, for the purpose " of giving solidity to the point or rails in the chair, and avoid- " ing that motion which causes them to work loose, and for pre- " venting the rails rising from the chairs, there is a fillet cast " on the distance piece, and also a fillet formed on the loose block, " which fit into grooves or mortices made in the wing and point " rails."

"Fourthly, in supporting in a similar manner, with filling " pieces, the upper flanges of switches and stock rails of the " ordinary form, where the wheels bear partially upon the rails."

[Printed, 8*d*. Drawing.]

A.D. 1853, April 27.—N° 1014.

GALE, JOSEPH WALTER.—"Improvements in the permanent " way of railways." "The improvements consists in the employ- " ment of certain materials, consisting of clay or compounds of " clay with other substances of harder nature, containing quartz " or other silicious materials, for the purpose of manufacturing " railway sleepers."

"The chair is attached to the sleeper by means of screw bolts, " formed with stirrups, for the reception of a bar of iron, which " serves as a tie bar, to preserve the guage of the line; one of " these bolts serves to fasten the rail, by keeping a metal jaw in " close and firm contact with its side, thereby obviating the use " of keys or wedges.

"A second form of chair is fitted with a pair of lugs, which " clip the sides of the sleeper, being secured thereto by a trans- " verse cottar or key. The chair is formed of two distinct pieces " or cheeks, fitting one into the other, and the rail is held " between them by driving up the cottar before mentioned."

Any form of chair may be secured to these sleepers; "or if " no chair is employed, then the rail may be attached by the " employment of lead," in the usual manner of forming such unions.

The patentee places the chair on an elastic bed to prevent the ill effect of vibration.

[Printed, 6*d*. Drawing.]

A.D. 1853, May 4.—N° 1099.

WALKER, JAMES.—"Improvements in turn-tables used for " railway and other purposes."

The invention consists in a "re-arrangement of and additions " to turn-tables, by which they are rendered" what is termed " self-acting, the motive power for the purpose being obtained " from the gravity of the object (a locomotive or other vehicle for " instance), to be turned when placed upon the table descending " *from the level* at which it passes on to the table to a lower one

" where it passes off. It is accomplished, first, by inclining the " paths upon which the wheels or rollers of the table travel " sufficient to cause the table to revolve or run down by gravity; " second, by employing a weight sufficient to balance the table " on the incline, and to overcome the friction so as to bring the " table back to its highest position, when it is free to return; " third, by employing two sets and levels of rails, the high level " to pass on to the table, and a low level to pass off after the " vehicle has been turned. The rails of the table when at their " highest level may be made to form part of a permanent way " passing across it, and when at its lower level the continuation " of a way branching into the permanent way at each side of " the table through self-acting points. With a turn-table thus " arranged it will be seen that if a weighty object be placed upon " it the balanced state of the table on its inclined path will be " destroyed (provided the increased gravity is sufficient to over" come the friction, and the addition to the balance weight for the " purpose of bringing the table to its highest level) and the table " will descend and turn by reason of the wheels or rollers running " down their inclined paths."

[Printed, 8*d*. Drawing.]

A.D. 1853, May 13.—Nº 1180.

ARROWSMITH, JOHN.—(*Provisional protection only.*)—" A " new or improved turn-table."

The invention " consists of a hydrostatic or floating turn-table " constructed in the following manner:—Two wrought-iron " basins " are made, " one of somewhat larger size than the other; " the larger one is firmly imbedded in masonry on the ground, " and the smaller one is placed therein, and floated by means of " water placed between the two. The said basins are made of " wrought-iron plates, after the manner in which steam boilers " are made. The inner floating vessel is closed at top, and the " rails are properly arranged thereon; the larger basin is furnished " with an inlet and an outlet pipe, so as to regulate the quantity " of water to suit engines and tenders of different weights; and " the inner or floating basin is provided with rollers working " between angle irons affixed to the outer basin, so as to limit " the height to which the said floating basin rises on the removal " of the weight of the engine or other body. The said floating

" basin is also provided with an apparatus for fixing the same " during the passing off of the weight."

[Printed, 4*d*. No Drawings.]

A.D. 1853, May 19.—N° 1245.

DE BERGUE, CHARLES.—" Improvements in the permanent " way of railways, and also in chairs and in sleepers for permanent " way."

The improvements are,—

Firstly, " an improved mode of securing a rail to a chair " (whether of wrought or cast iron) and the chair to a sleeper " by means of one bolt, screw, or other fastening, and an adjustable clip or holding piece.

Secondly, effecting the same objects " by means of two bolts, " screws, or other fastenings placed on one side of the rail, and " an adjustable clip or holding piece, or two " if preferred.

Thirdly, a mode of " securing chairs to sleepers having notched " or shouldered chair seats or beds by means of one bolt, screw, " spike, trenail, or other fastening."

Fourthly, " an improved mode of making chairs with a stud or " projection from the under side to assist in preventing the chair " from shifting or moving on the sleeper."

Fifthly, " an improved mode of making wrought-iron chairs for " permanent way, having bended clips or holders, by setting or " bending up the clips or holders, and also setting or bending up " shoulders or projections, without turning over or bending back " those parts of the metal which form the bended clips or holders " and projections."

Sixthly, " an improved mode of making chairs for permanent " way with one hole or opening only for receiving one bolt, " screw, or other fastening, or with two holes or openings, both " at one end of the chair, for securing the same to a sleeper, and " also, when preferred for also securing the rail in or upon such " chair."

Seventhly, " an improved mode of making chairs which have " a holding clip only, or a holding clip and shoulder, by first " rolling a bar of wrought iron with an upright raised rib or ridge " (and also with a smaller rib when a raised shoulder is required), " and afterwards bending or setting such upright rib or ridge " to an angle so as to form it into a holding clip. Or by rolling " a bar of wrought iron of such an angular form, and with raised

" ribs or flanges of such shape, that when the bar is afterwards " flattened one rib or ridge will form an angular holding clip, " and the other a raised shoulder; or, when a second rib is not " required, the forming a sunk shoulder by a recess, groove, or " indentation."

Eighthly, a mode of " making cast iron sleepers which form " both sleeper and chair." These sleepers are adapted to support " flat bottomed or bridge rails " in such a manner that " the rails " may rest upon a raised central disc or annular ring, or upon " raised ribs or feathers transversely arranged."

[Printed, 1s. 4d. Drawings.]

A.D. 1853, June 3.—N° 1365.

WILSON, James Spotswood. — " A machine or apparatus " for digging or raising earth, and applicable to agricultural or " engineering purposes."

A number of " wheels or cylinders " are placed on an axle, " each cylinder being furnished, at equal distances round its " circumference, with curved pick-shaped prongs; the peculiarity " of the curve in relation to the size of the wheel on which they " are placed having this characteristic, that each point where " it comes in contact with the ground represents a segment of " the curve which a point on the periphery of the wheel would " describe at each revolution while travelling over the ground, in " consequence of which the pick-shaped digging points receive " the direct pressure of the wheel throughout their length, and as " the wheel passes over the position of the picks in relation to the " surface becomes gradually reversed, so that they rise out of the " ground at right angles to the line at which they entered, lifting " the soil with them."

In order to turn over the soil, " angular mould boards " are applied, " to receive the earth as it falls from the digging cylinders, " and lay it over."

When the soil is tenacious or encumbered, " circular revolving " coulters or cutters " go " in advance of the digging cylinder," and by " cutting the surface into breadths corresponding to the " distance between each set of digging points," facilitate the work.

The invention is described as being applicable to railway purposes.

[Printed, 8d. Drawing.]

A.D. 1853, June 7.—Nº 1400.

DAVIS, Thomas, BLOOMER, Boaz, and BLOOMER, Boaz, jun.—(*Complete Specification, but no Letters Patent.*)—"Improve-" "ments in the manufacture and piling of iron, to be used in the" "production of railway chairs."

The "invention consists, firstly, in rolling lengths of iron" "intended for the manufacture of railway chairs in separate bars" "or strips, and afterwards combining and piling them in such" "manner as from the arrangement of the fibre of the metal to" "ensure greater strength."

"The manufacture is as follows:—The lips, or those portions" "of the bar intended finally to form the lips of the chairs are" "first brought into a form closely assimilating in section, the" "form required for this part of the chair, by passing the iron" "between grooved rollers. These bars are then placed on one" "or more flat rolled bars of iron, and the whole having been" "reheated is again drawn through grooved rollers, by which the" "iron is wedded together." The remaining operations are "the" "same as those now practised in making rolled railway chairs."

[Printed, 6*d*. Drawing.]

A.D. 1853, June 13.—Nº 1427.

SMITH, William Henry.—"Improvements in the permanent" "way of railways."

The invention consists in the adaptation and application of "a" "form of rail or a bearer for rails which admits of the rail or" "bearer being imbedded in the ballast, and constituting a firm" "line of railway without the use of the ordinary sleepers, by" "means of the vertical and lateral rigidity which such form" "presents." The rail may be applied to sleepers of the ordinary construction.

"The form of rail or bearer thus referred to is such as to" "constitute in the cross section, at intervals, a central vertical" "support with lateral supports between such intervals. These" "lateral supports occur alternately on either side of the vertical" "supports in such a manner as to form in combination therewith" "a continuous undulating line on the under surface of the rail or" "bearer. They are also formed and arranged in such a manner" "as to leave hollow spaces in which the ballast may be packed," "so as to afford much firmness to the line."

[*Printed, 8d.* Drawing.]

A.D. 1853, June 25.—N° 1548.

ANDRAUD, Antoine.—" Certain improvements in railways " and locomotives running thereon, which improvements facilitate " the ascension of steep inclines."

Wooden rails or trams are laid adjoining the usual iron rails; the driving wheels of the locomotive are roughened at their outer edges where they bear on the wood rails, for the purpose of obtaining adhesion.

[Printed, 6*d.* Drawing.]

A.D. 1853, June 29.—N° 1573.

WRIGHT, Lemuel Wellman.—(*Provisional protection only.*) —" Improvements in the permanent way of railways."

A T-rail is used, laid between two cheeks of angle iron which form a continuous chain. The ends of the rails meet on sleepers. The sleeper is a compound structure of two pieces of timber, one above the other, and so contrived that by driving a wedge between them, at one end, the level or cant of the rail may be secured.

[Printed, 6*d.* Drawing.]

A.D. 1853, July 8.—N° 1624.

DANGERFIELD, Benjamin, and **DANGERFIELD**, Benjamin, Junior.—(*Provisional protection only.*)—" Improvements " in constructing and fixing the rails of railways."

The upper part of the rail has the form of the ordinary rail; the lower part is formed of a longitudinal rib, which enters and fills the space between longitudinal ribs formed on the base plate. Pins pass through the ribs and fasten them together. The pins are secured in their places by nuts. The ribs and rails break joint. The base plate may be affixed to a suitably formed chair, or it may be sufficiently wide to be attached to the wood or stone constituting the bed of the railway.

[Printed, 6*d.* Drawing.]

A.D. 1853, July 18.—N° 1708.

FONTAINEMOREAU, Peter Armand le Comte de.—(*A communication.*) " A new mode of equilibrating indefinitely the " weight of *atmospheres for* buffers, &c."

"The apparatus is composed of a metallic cylinder in which
" compressed air is confined between the piston and the end."

[Printed 1*s*. Drawings.]

A.D. 1853, July 30.—N° 1780.

DOUGLAS, George Katz.—" Certain improvements in the
" permanent way of railways."

The invention " consists in improvements in constructing
" railway chairs, and in jointing and securing rails in railway
" chairs."

"The chair is made with two pairs of jaws, which are cast
" together in the usual manner, and are sufficiently wide apart at
" the top to admit the rail. Between the jaws and the body of the
" rail is a plate; this plate is swelled out between the jaws in
" order to strengthen it; and the plate is held in contact with the
" other side of the rails by vertical gravitating wedges." These plates and wedges are made of cast-iron or wood. " When the
" wedge is made of wood it is requisite to have a hole in the chair,
" through which the wedge can be forced when the rail has to be
" removed. The sides of the wedges are rounded, and the jaws
" and plate are recessed; by this means the plate and wedges are
" held in their proper position." Various modifications are shown.

Also in a " mode of holding the common bridge rail in a chair.
" The chair is made with a projection, fitting into the rail to hold
" it laterally. The vertical gravitating wedges may also be employed in securing the contractors and bridge rails in their
" chairs by making the jaws and the plates or blocks of suitable
" shape."

"The above-described improvements in railway chairs are also
" applicable to those chairs that are cast with the sleepers."

[Printed, 8*d*. Drawing.]

A.D. 1853, August 1.—N° 1793.

PERRING, John Shae.—" Improvements in the permanent
" way of railways."

"The invention relates to an improved form of . . . . .
" points or switches, and consists in so forming the rails which
" constitute such apparatus that they can be turned over and
" *used on either side,* (that is to say) the two moving or tongue

" rails are cut or otherwise formed to a pattern which will admit of " their being adapted either side up, so that when the one surface " is worn out the other may be brought upward for the carriages " to run upon, and in like manner " the fixed rails are constructed which constitute the other portions of switches.

[Printed, 6d. Drawing.]

A.D. 1853, August 9.—Nº 1855.

BAINES, William.—" Improvements in railways."

" The rails are made with ribs or projections on their sides, and " at right angles, or nearly so, to the sides, to receive the fish " joints, by which the fish joints will offer a better support at the " crossings; the rails which come together at an angle or form " the point are made similar in form at their under surfaces to " what they are at their upper surfaces, so that when worn on " their upper surfaces they may be turned over, and their under " surfaces made the upper ones; and in order to fix the rails " more securely in chairs than heretofore, and to allow of the " rails of a railway to be turned over, and thus to be used on " both sides, each chair is made with a hollow jaw on one side to " receive a filling piece, which will, when a rail is turned over, " adjust for the deficient part of the rail which is worn away; " the other jaw is also made hollow and inclined to receive a " thickness of wood or flexible material, between which and the " rail adjusting metal wedges are used, which in one form are " drawn towards each other, and in the other form they are made " to rotate in face of each other, and the faces being made with " steps and incline, the more they are moved the more strongly " they are caused to hold, and the chairs are fixed to sleepers by " clipping blocks of wood, which together with the chairs are " fixed by treenails which pass into the sleepers."

[Printed, 6d. Drawing.]

A.D. 1853, August 16.—Nº 1918.

RICHARDSON, George.—" Improvements in railway signals " and in the means of preventing accidents upon railways, and " in the apparatus connected therewith."

Apparatus is contrived which is acted upon by the flange of the wheel, or *other projection* from a locomotive, such apparatus acting upon detonating or other signals, to indicate to the driver the existence of danger in advance of him. This apparatus, though at a distance from the signalman, is to be placed under his control by means of connecting wires or other gear.

The invention also consists in causing the setting of the danger distant signal to put in position an apparatus to be acted upon by other apparatus carried by the locomotive, so that an alarm, as above, shall be given, except when the driver, by having duly noticed the signal, has previously moved out of the way the apparatus under his control.

Finally, the gates closing the roads and lines are so connected in pairs that the opening or closing of either gate of each pair shall cause the simultaneous movement of the opposite gate; and those gates which form the barriers across the lines "are so fixed " on axes under the rails that they may readily be caused to rise " up before the road gates are opened for crossing the line, and " be depressed to the horizontal position with proper celerity " when the road gates are again closed, the signal of 'danger' " & 'all right' respectively being duly given at a distance from " such crossings by this operation."

[Printed, 1*s*. Drawings.]

A.D. 1853, August 23.—Nº 1956.

COWPER, Charles.—(*A communication.*)—(*Provisional protection only.*)—"Improvements in the permanent way of railways."

"Rails are to be made consisting of a broad flange, with a central " part projecting above it, and a similar projection below it, so that " it may be placed with either side uppermost, and the upper " projection then serves for the wheels of the carriage to run upon, " while the lower projection is bedded in the sleeper or bearer, " or in the ballast upon which the broad flange of the wheel " rests."

"These rails may be turned end for end or shifted to opposite " sides of the line of way, in order that when one edge of the rail " is worn or injured the other edge may be brought into its " place. When it is not required to invert the rail the lower part " may be of different form from the upper part, and may be " employed for preventing any lateral motion of the rail on the " ballast or support."

"To fix rails upon sleepers or bearers the bottom of the rail is " *bedded in a slight* recess in the sleeper or bearer, and a block

" of wood or iron or other suitable material is fitted to each side " of it, so that one end of each block buts against the side of the " rail, whilst the other end buts against the end of a recess made " in the sleeper or bearer. Bolts and nuts, or screws or other " suitable means are applied for forcing down these blocks, and " thus causing them to grip the rail very firmly between them. " When iron blocks are employed a small key or packing of wood " or other elastic material may be introduced between them and " the rail. In some cases the blocks and rail may be fitted into " a metal plate, which may be itself embedded, in or fixed to the " sleeper or bearer."

[Printed, 4*d*. No Drawings.]

A.D. 1853, August 27.—N° 1991.

STIRLING, John Davie Morries.—" Improvements in the " manufacture of rails and parts of railways and tyres of railway " wheels."

"This invention has for its object the piling certain descriptions " of iron for the purpose of being rolled into bars for the rails of " railways, for switches and crossings of railways, and for tyres " of railway wheels, and consists of piling bars of iron rendered " crystalline by means of tin, antimony, arsenic, or bismuth, with " bars of other iron (combined or not with zinc), to give fibrous " character to the interior and other parts of such compound bars, " the crystalline iron coming to the wearing surfaces."

[Printed, 6*d*. Drawing.]

A.D. 1853, September 14.—N° 2136.

SPENCER, George.—" Improvements in supporting rails of " railways."

This invention consists in " applying longitudinal bearers of " iron which are corrugated transversely or across in such manner " that the rails, whether fixed directly to the bearers or indirectly, " are supported by the convex parts of the corrugations; and in " some cases " wood is combined therewith, or there are other bearers, below the corrugated longitudinal bearers of iron.

[Printed, 8*d*. Drawings.]

A.D. 1853, September 14.—N° 2138.

SWINGLER, Thomas.—" Improvements in the permanent way " of railways."

"The object of the invention is to simplify and reduce the cost "of labor in the manufacture of switches and crossings; the "principal feature of the invention consisting of an improved "mode of fastening the back rail of a switch, and of forming "a switch so as not to require any manipulation of the back rail, "which cannot be readily done by the rail layer on the railway, "so that a back rail (which wears much faster than a switch) "being worn out on the upper surface it may be turned, or a "new one put in its place. For this purpose the rail is fixed "on the outer side by chairs with a wooden key, resembling "ordinary railway chairs, except at the first point of support "from the end of the switch, where the chair is constructed so "as to support the rail on the bottom and outer side only."

The bearing surface of switch chains is curved, to prevent stones lodging.

The inventor also proposes to cut "vertically the points of the "switch to the depth of only the flange of the wheel, leaving "the lower three or four inches of the full width, by which the "necessary strength of the end of the switch is retained."

"Another part of the invention consists of a mode of attaching "rails to chairs and sleepers by casting them on the rails." Rails with V-shaped sides are used for the side rails of the crossing and "back rail of the switch, and the rails and points which may be "of forged iron or steel, are attached to the mould or moulds, "being heated to the required heat; the upper surface of rails "being 1¾-inch or thereabouts above the surface of the mould "or moulds for the cast-iron plate or chair of the crossing or "switch."

"The cast-iron plate is a continuous plate when used in iron "roads, but for wooden sleeper roads separate chairs are cast on "the rails and point," and a solid square rail, "which has a "hole drilled or formed in it where the chairs occur" is preferred "in order that a more firm connexion may take place.

It may be advisable in "crossings to attach the point alone by "casting it on the iron sleeper or chair, the side rails being otherwise fastened, or the side rail alone may be attached by casting, "leaving the point to be otherwise fastened."

"In cast-iron roads the guide or check rail of the crossing is "formed of cast iron, and cast in connexion with the cast-iron "sleeper, instead of using a piece of rail fastened in chairs, as is "*usually done.*"

"Sleepers having two chairs cast transversely, or four chairs "(two being transverse and two longitudinal) are used where "there is not width between the rails for ordinary cast-iron "sleepers."

[Printed, 1*s*. Drawings.]

A.D. 1853, October 3.—N° 2259.

JEE, Alfred Staniststreet.—(*Provisional protection only.*)— " Improvements in the construction of rails for railways."

"This invention consists of making the rails for railways each "of two parts longitudinally in such manner that the bearing "surfaces are undivided, whereby also the parts may be put "together so as to break joint, and thus render what is termed "'fishing' or 'fish jointing' rails unnecessary. For this pur"pose the bearing surface of the rails is rolled as heretofore of "any desired form and undivided, but the portions of the rails "below the bearing rails are rolled or formed into two parts "longitudinally, which when laid together form the section of "the rail desired. The parts of which the rails are composed "are fixed by rivits or other convenient manner."

[Printed, 4*d*. No Drawings.]

A.D. 1853, October 8.—N° 2303.

POOLE, John, and KEMP, James Colquhoun.—(*Provisional protection not allowed.*)—" An improvement in the construction of "railway chairs and railway engine carriage and waggon wheels, "and the mode of manufacturing railway chairs, and fixing the "railway bars." The invention consists in—

"The removal of the whole or greater part of one cheek or lug "of the present chairs now used upon railways or other tram "roads; the method of fixing the railway bars or tram plates to "the chairs, and an increased diameter or depth of the flange "of railway engine, carriage, or waggon wheels, and the mode or "process of manufacturing railway chairs."

[Printed, 4*d*. No Drawings.]

A.D. 1853, October 8.—N° 2311.

MAY, Charles, and SAMUEL, James.—" Improvements in "*joining the ends of the rails of railways.*"

"The first part of the invention consists in a mode of welding "the ends of the rails used in the construction of railways. " To accomplish this grooved rollers or tools are arranged in a "portable machine in such a manner that when the ends of "two rails at a welding heat are brought together and are held "stationary the rollers may be moved to and fro, and caused to "press more and more on the heated iron, and thus produce "a welding of the parts. The edges or peripheries of such rollers "being turned of the proper form will leave the rail of the right "shape for the wheels to run upon them.

The second part of the invention "has reference to cases in "which it is desired to fish joint the rails of a railway in use. "For this purpose it is requisite to pierce a hole or holes near "the end of each rail to allow of a bolt or bolts passing through "to attach the fishing plates, usually two holes in each rail, so "that four bolts are used to each fish joint, as is well understood "by engineers; and to pierce these holes and attach the fishing "plates without stopping the traffic or incurring danger to the "trains," a machine is adopted "that forms at the same time a "drill and a temporary joint chair."

The third part of the invention "relates to the joining the ends "of rails by means of melted metal poured thereon in a mould "surrounding the ends of the bars; . . . . the object is so to "perform this process as to prevent the rails from drawing "asunder endwise," which is accomplished "by piercing the end "of each rail with one or more holes of sufficient size to allow "the molten metal to run through and unite the two sides," or there are "put in the holes a short piece of wrought iron previous "to pouring on the metal, which may be riveted up when the "mould is removed; . . . . these joints are made so as to come "between two chairs or supports in the same way that fish joints "are usually applied, or they may be of a form suitable to become "supports or chairs for the rails."

[Printed, 8*d*. Drawing.]

A.D. 1853, October 10.—N° 2320.

BROOMAN, Richard Archibald. — (*A communication.*)— "Improvements in railway switches."

"The operation of the invention is such that in the case of a "*train approaching* a switch which has been carelessly left open,

" or so as to run the train upon a side track, the rails will be made " to adjust themselves by the force of an auxiliary power as a " spring or weight coming into action before the wheels reach the " switch, the wheels of the locomotive effecting the disengagement of a bolt by means of proper mechanism placed along the " track, and extending a sufficient distance to allow enough time " to elapse for the movement to take place between the moment " the wheels strike the disengaging apparatus, and that at which " they come upon the switch rails when under the highest possible rates of speed. In the construction of self-acting switches " it is important that the parts required to move shall always be " free to do so. This is not always the case, because such parts " are liable to become choked or clogged up by dirt and other like " obstructions falling upon them, and because also in very cold " weather the shifting rails and sleepers are liable to become " frozen. All these difficulties have been overcome by the present " improvements."

The inventor makes use of a switch chair "having its seats so " arranged as to cover the bearing surface, and keep the same " free from dirt and other obstacles." He also claims the construction of the "shifting sleeper" for the same object.

[Printed, 6*d*. Drawing.]

A.D. 1853, October 11.—N° 2323.

KEMP, Henry.—(*Provisional protection only.*)—" Certain im- " provements in the preparation of wood for sheathing ships " as a substitute for copper and other metals, also in house, ship, " and pier buildings, &c., &c.," including railway sleepers.

The patentee makes use of barytes, sulphate of copper, arseniate of copper, and red lead in his process.

[Printed, 4*d*. No Drawings.]

A.D. 1853, October 21.—N° 2437.

LLOYD, Samuel, the younger.—" Improvements in the con- " struction of turntables."

The invention consists "in the introduction of a toggle or " other lever or levers under the centre pin or pivot of turntables, " by means of which the turntable may be raised when required " for use, it being so constructed that, except while it is raised, " the weight is not carried on the centre pin or pivot, but on " the ring or frame at its periphery, or on rollers placed at its

" periphery. By this means, when the turntable is at rest it is " quite steady and solid, and is not likely to be injured by trains " passing over it, whereas as soon as the centre pin or pivot is " made to rise by means of a lever or levers under it being " worked by another lever or levers in connection therewith, the " turntable is raised, and may be turned with great facility, the " weight resting then on the centre pin or pivot. Provision is " made, as in other centre-bearing turntables, for the weight of " the table not being equally poised on the centre pin or pivot, " by means of horizontal rollers which are fixed round the centre " pillar of the turntable, and serve, by their contact with this " pillar, to preserve the turntable in a level position while rising " and while in use. When the turntable is no longer required, " the lever on which the pin or pivot had been resting is lowered, " and the turntable brought to its original position, in which it " is retained by a catch or catches."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1853, October 31.—N° 2512.

PARSONS, Perceval Moses.—" Certain improvements in the " switches and crossings of railways," consisting,—

Firstly, in " making those parts of the wing and point rails of " crossings, and the tongue rails of switches which are subjected " to the greatest wear, more durable, and in constructing them in " such a manner that the parts when worn out can be removed " and replaced without removing or replacing the whole of the " rail."

Secondly, in " securing the wing and point rails of crossings so " as to render the points firm and rigid, and prevent any relative " motion between them and the wing rails." The first part is accomplished by " removing a portion of the upper part of the " wing and point rails of crossings and the tongue rails of " switches, at that part most subjected to wear, and replacing " such portions by other pieces of a suitable form, and securing " them firmly to their places by means of bolts, screws, keys, or " wedges, or by dovetailing, wedging, rivetting, or casting such " pieces on to the rails." The second part is accomplished by " using keys, wedges, blocks, saddles, or other similar contri- " vances, made to fit in between the wing and point rails, and " made of a suitable form, or having tongues or other projections " to fit into grooves or other recesses formed in the aforesaid

" detached portions, or vice versa, or formed by the said detached " portions and the rail jointly; and in cases where such detached " parts are not used, and the wing and point rails are of a suit- " able form, by using keys, wedges, blocks, or saddles made to " fit in between the wing and point rails, so as to bear against " the under surface of and support the upper tables, and to bear " against and rest upon the upper surface of the lower tables of " the wing and point rails."

[Printed, 8*d.* Drawing.]

A.D. 1853, November 4.—N° 2558.

SCOTT, JAMES.—" An improved apparatus for shifting car- " riages, waggons, engines, and other vehicles on railways and " tramways."

" This invention has reference to a portable apparatus which " may be carried with the engine, or guard's van, so that in the " event of an engine or a carriage being thrown off the line it " may be readily replaced by means of this apparatus in much " less time than the same can be done by the appliances at " present in use, such as screw jacks, crow bars, planks, &c.

" The apparatus consists of two portable rails, which are kept " in their proper positions by two bars, with a knee at one end to " take hold of the permanent rail, and with holes in the other " end to allow the portable rail to extend to any distance that the " wheels of the vehicle may have been projected from the per- " manent rail when thrown off the same by accident."

[Printed, 6*d.* Drawing.]

A.D. 1853, November 4.—N° 2568.

JOHNSON, JOHN HENRY.—(*A communication from Clement Desormes.*) — (*Provisional protection only.*)—" Improvements in " the manufacture of malleable iron, which improvements are " also applicable to the manufacture of other malleable metals."

" This invention relates to the manufacture of malleable or " wrought iron and other metal bars to be afterwards used in the " construction of axles, rails, tyres, &c., and consists in twisting " a number of bars singly, and afterwards faggoting them together " to be welded or rolled in the ordinary manner. By this means " a much tougher material is obtained than by the processes at " present adopted."

[Printed, 4d. No Drawings.]

A.D. 1853, November 8.—N° 2595.

SHEPHERD, George.—"Certain improvements in the con-"struction of railways."

The invention comprises the use of hollow sleepers made of wrought or cast iron, corrugated or plain, and in various combinations, of which many examples are shown in the Specification.

[Printed, 8*d*. Drawing.]

A.D. 1853, November 9.—N° 2597.

DUNN, Thomas, BOWMAN, James, and DUNN, Joseph.—"Improvements in machinery for raising, moving, and lowering "heavy bodies."

The patentees describe fourteen different improvements in travelling jib and derrick cranes, the eighth of which refers to a crane "which may be mounted on a truck for railway purposes;" and the thirteenth has reference to a method of lifting locomotives or carriages from their wheels, by means of four hydraulic cylinders and framing placed under the frame of the locomotive or carriage.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1853, November 10.—N° 2606.

FONTAINEMOREAU, Peter Armand le Comte de.—(*A communication.*)—(*Provisional protection only.*)—"Improvements "in preventing accidents on railways, also in shifting and lifting "railway carriages."

The invention comprises arrangements—

"Firstly, for enabling the driver of a train to change the line of "rail. Secondly, for communicating along the train. Thirdly, "for superseding turntables. Fourthly, for moving and lifting "railway carriages." In the first case, the driver of the train works the points by lowering an eccentric, which engages with certain mechanism. In the third, the patentee makes use of a number of small trucks or traversers, on which the wheels of the carriage to be moved rest. In the fourth, certain apparatus running or resting on the rails is described as intended for lifting or replacing carriages.

[*Printed, 1s. 8d.* Drawings.]

A.D. 1853, November 22.—Nº 2719.

BURLEIGH, Benjamin.—" Improved railway crossings, as
" adapted to the double-headed rail and the ordinary rail and
" chair."

The distinguishing feature of the invention " consists of certain
" pieces of solid metal called flange bearers being inserted and
" bolted between the wing rails, and between the wing and point
" rails, for giving support to the flanges of the wheels while pass-
" ing over them, and thereby greatly increasing the strength and
" durability of the crossings."

[Printed, 8d. Drawing.]

A.D. 1853, November 23.—Nº 2730.

KINDER, Thomas William.—" Improvements in the con-
" struction of the permanent way of railways."

The invention " relates to an improved construction of rail, and
" consists in rolling them first in long and nearly flat lengths,
" with a heavier amount of metal in the middle of the roll; the
" plate is afterwards brought into the requisite shape for the rails
" by suitable rollers; these rails may either be secured by Norris's
" patent chairs, cast on to the rail, or by any other system, the
" objects of the invention being the substitution of a hollow rail
" of equal strength, and of considerable less expense than the
" present solid rails."

[Printed, 8d. Drawing.]

A.D. 1853, November 30.—Nº 2789.

LOUBAT, Alphonse. (*Provisional protection only.*)—" Im-
" provements in the construction of tramways."

" This invention relates to the application to ordinary roads of
" a rail having a grooved upper surface, such rail being intended
" to serve as a tramway for waggons and other vehicles. The
" rails are set in such a manner in the road as not to project above
" the surface thereof; they will therefore present no obstacle to
" the progress of the ordinary traffic. The rail is provided with
" a longitudinal groove of a **U** or **V** shape in section, for the
" reception of the flanges of the carriage wheels. These improved
" tram rails, which may be applied either to macadamized or
" paved roads, may be bolted in any convenient manner to trans-

" verse and longitudinal sleepers, in the ordinary manner of " laying down tramways or railways."

[Printed, 4*d.* No Drawings.]

A.D. 1853, December 2.—N° 2801.

CALLEN, Arthur Wellington.—(*A communication.*)—(*Provisional protection only.*)—" An improved excavating and dredging " machine."

" The invention consists of a machine for excavating earth-" works in docks, railways, and other cuttings, and for excavating " under water, and dredging the beds of rivers and harbours.

"The excavator consists of a long beam, at the end of which is " fixed a strong iron scoop or bucket, the back end of which opens " upon hinges, so as to discharge the material excavated, when it " closes by its own weight, and when closed the end is held " secure by strong iron catches and drop bolts. . . . . On the " under side of the excavator beam there is a rack, which works " on a pinion fixed between the two head beams of the crane, and " by turning this pinion the excavator is raised or lowered " according to the depth required. . . . . To the excavator are " attached two strong chains, one of which is fixed to the scoop " or bucket, and thence passes over the end of the crane to the " engine, and when the engine is put in motion this chain draws " the scoop or bucket forward, through the material to be exca-" vated, and raises the scoop and beam to the proper height.

" When all the material has been excavated within the range of " the machine, it is either moved or floated to the right or left, or " backward or forward, as the case may be, and the operations " before mentioned are again repeated."

[Printed, 4*d.* No Drawings.]

A.D. 1853, December 2.—N° 2812.

SAUNDERS, Jonathan.—" Improvements in the manufacture " of rails for railways."

" The object of this invention is to obtain a manufacture of " rails with steel at the wearing surfaces, and the invention con-" sists of a peculiar means of piling iron and steel, and rolling " the same into railway bars. For this purpose a pile is formed " by means of several portions of bars of blistered steel laid " together on portions of bars of iron, the top and bottom of "the pile being composed of slabs or bars of iron. This pile is heated and rolled into a long slab, suitable in dimension for making one or more surfaces of further piles, each of which is composed of a portion of the slab above mentioned, and two or more layers of iron, the steel being outwards. These piles are then rolled into railway bars, the steel coming to the wearing surfaces."

[*Printed*, 6*d*. Drawing.]

A.D. 1853, December 3. No 2818.

ILIFFE, Henry Jeremiah, and NEWMAN, James.—(*Provisional protection only.*) "Certain improvements in the construction of metallic bridges and other similar structures."

"The improvements consist in manufacturing the various parts or details required in the construction of such like structures as metal bridges, floors, and aqueducts, and in arranging and combining those details in such manner that great strength and resistance is obtained with comparative lightness and economy in labour and material." For this purpose it is proposed "to employ metallic tubes for every portion of the structure that will admit of this adaptation." Longitudinal girders rest on the piers. "These girders are in section of the form of elliptical or rectangular tubes, having a flange or fin top and bottom, running the entire length of, and manufactured at the same time as, the ellipse or rectangle. For larger purposes the tubes may be made of plates rivetted together. These tubes are secured laterally by transverse tubes passing at intervals through eyes made for that purpose in the fins, and are further strengthened by short tubes, each of the length of the distance between the longitudinal girders, with flanges at both ends; these short tubes are passed over the transverse girder tube, and each is firmly secured between the longitudinal girders by being rivetted through the flangers at the ends to corresponding flanges round the eyes in the fins of the longitudinal girders. The sides of the bridge consist of tubular columns rising from the long girders on either side, and carrying a cornice and parapet, and roof. . . . . Should it be required to form a double level bridge for road and railway, the rails for the latter may be rolled on the fins of the long girders."

[*Printed*, 4*d*. *No Drawings.*]

A.D. 1853, December 8.—N° 2853.

BEALL, JAMES.—" Improvements in apparatus for applying
" sand to the rails of railways."

" For this purpose the sand is placed in a suitable vessel, the
" shape of which may be varied, and from this vessel a tube
" descends to near the surface of the rail on which the sand is to
" be laid, and in order to regulate the supply of sand a valve is
" employed near the upper part of the tube, which when down
" closes the opening into the tube. The valve is in connection
" with a suitable pull or instrument for opening it, and keeping
" it open against the action" of a vulcanized india-rubber or
other spring.

[Printed, 6*d*. Drawing.]

A.D. 1853, December 31.—N° 3030.

MILNER, JOHN.—" Improvements in connecting the rails of
" railways."

The rails are connected by " inserting one or more short pins or
" dowels into holes drilled in the abutting ends of the rails.
" The vertical and lateral motion of the rails with regard to each
" other is thus prevented."

[Printed, 6*d*. Drawing.]

1854.

A.D. 1854, January 9.—N° 45.

BURLEIGH, BENJAMIN.—" Improvements in railway switches
" and chairs."

" This invention has for its object the improvement of parts of
" the permanent way of a railway, and consists of forming the
" tongue rail of a switch with a bearing surface for the flanches
" of the wheels when passing a switch to run on, by which
" will be prevented the shocks heretofore consequent on the
" peripheries of the wheels coming against the fixed rail of a
" switch; and the chairs of such switches, and also for other
" parts of a railway," are formed of " wrought iron, by rolling
" *the same and* pressing the one side so as to receive and retain,
" *when wedged or* keyed therein, a double-headed rail; and in

" making the hinge chair, the same is constructed of wrought " iron, the hinge being formed of straps bolted to the main rail, " strutting tubes being interposed to give stiffness."

[Printed, 10*d*. Drawing.]

A.D. 1854, January 12.—N° 84.

WILKES, Samuel.—(*Provisional protection only.*)—" Improve" ments in the construction of chairs and rails for railways."

" The object of this invention is to obtain more correct support " at the joint chairs of railways. For this purpose the joint " chairs are made in such manner that there is in each chair " a bearing across it for the end of each rail, and the end of " each rail is notched or cut out to fit the bearing; and in order " that the chairs may better support the rails, the two jaws " or cheeks of each chair are formed correctly to slide on to the " ends of the railway bars so as not to require wedging."

[Printed, 4*d*. No Drawings.]

A.D. 1854, January 16.—N° 97.

CROSSKILL, William.—(*Letters Patent void for want of Final Specification.*)—" Improvements in construction of portable rail" ways," namely,—

" First, in making a railway of bridge rails, longitudinal sleepers, " and cross pieces, bolted or framed together in length or parts, " so that each length is portable; and, secondly, in the manner " of fastening together the ends of each length by sockets and " bolts, so that when put together they form one continuous " line, and can be laid down so as to be diverged when required " from a straight line and with sufficient flexibility to admit of " their being laid up and down hilly or undulating ground."

[Printed, 6*d*. Drawing.]

A.D. 1854, January 24.—N° 179.

ELLIS, William Irlam. — (*Provisional protection only.*) — " Certain improvements in turntables to be employed on or in " connection with railways."

The invention relates to the employment of " a *fixed central* " *post*, pillar, or stud, round or upon which the turntable is made " or caused to revolve, in contradistinction to the usual con" struction *of similar* turntables, wherein the post, pillar, or " *central support forms* part of or is attached to the upper

" framing or platform of the table, and consequently revolving " with it. The said turntables may be made or caused to revolve " either in connection with and by the assistance of rollers, " centre pin, or any other means or mechanical arrangement as " usually employed, or it may be made or caused to revolve " simply and alone round or upon the said fixed post, pillar, or " stud, suspended and maintained at the required height or level " by means of a cap or plate having a stud or pin projecting " from its centre on the under side fitting into a recess or step in " or upon the top of the said fixed post, pillar, or stud; the said " cap or plate being attached to the framing or platform of the " turntable by bolts and nuts, or any more suitable method. " The said fixed post, pillar, or stud may be supported by or " erected upon a foundation formed of masonry or any more " suitable or convenient means."

[Printed, 4*d*. No Drawings.]

A.D. 1854, January 30.—N° 219.

FONTAINEMOREAU, PETER ARMAND le Comte de.—(*A communication.*)—(*Letters Patent void for want of Final Specification.*) —" Improved means of preventing accidents on railways."

The apparatus described by the inventor is for the purpose of causing the train to work the switches. An arm, actuated by steam, on the locomotive comes into contact with levers which move the switch. Another arm on the rear of the train engages with a similar lever on the switch, but placed lower in position than the former to escape the locomotive, and replaces the switch in its normal condition.

[Printed, 6*d*. Drawing.]

A.D. 1854, February 9.—N° 309.

RAMSBOTTOM, JOHN.—" An improved hoist for raising and " lowering railway rolling stock and other articles."

The nature of the invention consists " in the direct application " of steam to work a ram or piston acting on water or other " incompressible fluid in such wise that in a hoist with two " platforms, each stroke of the said ram or piston causes one " platform to ascend while the other descends the entire lift; " also in the application of the said improvements to working a " hoist with a single platform or with more than two platforms."

[Printed, 10*d*. Drawing.]

A.D. 1854, February 10.—N° 327.

RIVES, Jacques.—" Improvements in railways and railway " carriages."

After describing his system of independent axles, the patentee says that passages round curves are rendered " more easy and " safe by arranging the axles in such a manner that they may be " set at any angle the one to the other, by means of screws or " other suitable instruments, which are acted on by an arm which " comes in contact with guides fixed in the roadway, and which " guides correspond with the curve at the commencement of " which they are placed ; and as the application of these improve- " ments renders necessary considerable steadiness in the train " the carriages are connected together " by means of bars, which " proceed from one side of one carriage to the other side of the " other, and vice versa, and the steadiness is increased while " running by imbedding in the process of rolling a bar of steel " in the tyre of the wheels, and in the rails on which they run. " The carriages are also so connected together that the sudden " stoppage or deviation from the right course of the front " carriage, by acting on a bar projecting from the carriage " behind, forces a skid under the wheels of the hinder carriage."

[Printed, 1s. 4d. Drawings.]

A.D. 1854, February 20.—N° 397.

BARLOW, William Henry.—" Improvements in securing and " connecting the rails of railways."

Two keys or wedges of cast iron, wood, or other suitable material are used for securing a rail or the adjacent ends of two rails in a chair. "The wedges are placed with their narrow ends towards " each other, and the side of the chair is shaped to fit them. A " long bolt passes through both wedges, and is provided with a " nut, by screwing up which the two wedges are drawn together, " and the rail or rails are thus firmly fixed in the chair."

"The wedges and the opposite side of the chair may be made to " fit close to the under side of the upper flange of the rail, and in " some cases " the rail or rails are caused to be " entirely supported " by their upper flanges resting upon the chair and the wedges."

In lieu of two wedges, sometimes one wedge is used, with a bolt of taper or wedge-shaped form, which is drawn up tight by means of the nut as before. Instead of employing the two opposite wedges, sometimes one long wedge is used, of cast iron or suitable material, and this wedge is fixed when driven in "by means of a small key, or by running melted lead or other "suitable metal into cavities made for that purpose in the back "of the wedge and in the chair."

A longitudinal trough and wedges may also be used on the above plan.

[Printed, 10*d*. Drawings.]

A.D. 1854, February 24.—N° 456.

BELLFORD, AUGUSTE EDOUARD LORADOUX. — (*A communication.*)—" Improvements in turntables for railways."

" The object of this invention is to construct a turntable which "shall possess the same strength and stability as the turntables "in common use, but may be constructed at a less cost, and which "will require a comparatively small and therefore less costly "foundation." It consists in "balancing the platform of the "turntable upon the revolving roller carriage which supports it "in such a manner that either end of the said platform may be "depressed to rest upon a bed or bearing provided for it, while it "receives or has discharged from it an engine and tender or any "carriage, and in furnishing the turntable between the roller "carriage and platform on opposite sides of the centre with "eccentrics, which are so arranged and can be so operated as to "support the platform on a level previous to turning it, and hold "it steady in such position during its revolution, or to raise one "end and depress the other upon its bearings when it is desired "to receive or discharge an engine and tender or carriage. It "also consists in furnishing the turntable with an indicator, "which shows the engine driver or any other person when the "platform is exactly on a level, or in which direction it inclines, "and thereby serves as a guide by which to move the engine and "tender, or any carriage upon a platform, to such a position as "to hold the platform in equipoise or on a level."

[Printed, 8*d*. Drawing.]

A.D. 1854, February 25.—N° 464.

LAMPORT, CHARLES.—" Improvements in machinery used in "ship building."

The patentee says that he employs "the ordinary railway for a "travelling crane, to run the whole length of the slip on which the "*ship is to be built.*"

[Printed, 10d. Drawings.]

A.D. 1854, March 8.—Nº 547.

DUNN, Thomas.—" Improvements in machinery and apparatus " for moving engines and carriages from one line of rails to another " and for turning them." The invention consists,—

" First, in constructing the bodies or upper framing of railway " traverses and turntables of a convex form, in order to increase " the strength and afford space for larger bearing wheels."

" Secondly, in supporting turntables on side rollers working on " an inner circular rail or plate."

" Thirdly, in the application of several small rollers, and a live " ring in place of the side rollers."

" Fourthly, in improved modes of constructing beams for rail- " way turntables."

" Fifthly, in making the centre piece of the platform of a railway " turntable with an inclined surface or surfaces in such wise that " when pressure is applied thereto the platform is partially raised " and caused to swivel on its centre."

" Sixthly, in the application to railway traversers of a centre " pin, so as to render the same capable of acting as a turntable."

" Seventhly, in causing the axes of the wheels of railway tra- " versers to radiate from a centre when traversers are used as " turntables."

" Eighthly, in so constructing turntables that the level of the " rollers or wheels in which the platform revolves can be regulated " from the outside thereof."

" And lastly, in regulating the centre pin of turntables by a " wedge and screw, instead of by screws only."

[Printed, 2s. 10d. Drawings.]

A.D. 1854, March 13.—Nº 606.

HOPPER, George.—" Improvements in pins for railway chairs."

" The invention relates to the manufacture of wrought-iron pins " or spikes as at present used for fixing and holding down the " chairs used on railways; the particular form or class of pin or " spike " referred to " is that wherein the body of the pin is spirally " twisted, so as to give it a better hold in the sleeper. . . . . " Such pins or spikes as hitherto made . . . . are manufactured " out of square bar iron, and the shank or body is left square " at its head, or neck portion beneath the head." According to this invention the *neck portion* is formed " round or cylindrical " *in transverse section instead* of square or rectangular. Pins or

" spikes made in this way fit accurately all round in the holes of " the chairs.

[Printed, 6*d*. Drawing.]

A.D. 1854, March 14.—N° 609.

RUSSELL, Frederick.—(*Provisional protection only.*)—" Improvements in apparatus for clearing obstructions on railways."

" This invention relates to the removing of obstructions on the " rails or to the clearing of snow from the line, and consists in " fitting to the front of the engine or first leading carriage or truck " of the train, a peculiar shield, made rather pointed or sloping " back from the centre on each side. This shield is nearly the " width of the line, leaving a clearance of about two inches on " each side between the edge of the shield, and the inner side " of the rails. A suitable framing is fitted to the front of the " engine or carriage to receive this shield, which constitutes the " snow clearer, acting as a plough to cut through the snow, " and turning it off sideways similar to the action of a ploughshare. For removing obstruction on the rails themselves a " pair of spring hinged guards or scrapers are employed, fitted " to each side of the engine or carriage framing, and situated " immediately over the rails. These guards or scrapers, placed " angularly over the rail, are so made that they may give slightly " either way should any fixed obstruction occur, as the starting of a joint in the rails for example. The bottom of the " guard, or that nearest the rail, is also made moveable, being " connected by vertical slides to the upper portion, and is " kept down near the rail by a curved spring. By this means " the oscillation of the springs of the engine or carriage is " allowed for, thereby enabling the guard to be much nearer " the rail than in the ordinary arrangement. These lower moveable pieces are made so that they may be easily taken off " when worn or out of order and new ones supplied."

[Printed, 4*d*. No Drawings.]

A.D. 1854, March 18.—N° 649.

PARSONS, Perceval Moses.—" Certain improvements in the " construction of the permanent way of railways."

The patentee says, " firstly, I construct the chairs which secure " the ends of the rails of a suitable form to receive them, and " I place in the jaws small blocks or pieces of wood or other " suitable elastic material, and I drive in wedges or keys of "cast or wrought iron or other suitable metal between and "against them and the rails, or I place in the chair against the "rails, metal keys, clamps, splices, blocks, or plates, and I drive "in wedges made of wood or other suitable elastic material "between and against them and the jaw of the chair.

"Secondly, I construct chairs for securing the ends of the rails "in similar parts, each being made with a jaw to receive the rail, "and a taper plate splice projecting from the under side of the "chair, and vice versa.

"Thirdly, in order to strengthen the chairs, ... I construct "them with ribs, webs, or flanges at the bottom and sides.

Fourthly, I secure the ends of the rails by means of clamps "or taper plates or splices, in two similar parts, made to fit "against the two sides of the rails, and support them by their "upper flanges, each clamp, plate, or splice having a jaw or arm "at one end, into which may be placed small blocks or pieces of "wood or other suitable elastic material to receive the opposite "end of the other; these I force each into the other with the "rail between, or I place each in the other with the rail between, "and I tighten them by driving in wooden or other elastic keys "or wedges between them and the jaws or arms." The clamps are secured to the sleepers.

Fifthly, the wooden keys are inserted with the ends of the grain of the wood abutting against the chair, or rail or other support. The keys may also be secured by notches or serrations in the metal with which they engage.

[Printed, 10*d*. Drawing.]

A.D. 1854, March 22.—N° 676.

WATSON, THOMAS SIMONS. — "An improved railway tra-"verser."

The invention consists of "an improved mechanical arrange-"ment for transferring railway carriages across a railway from one "line of rails to another, by placing such carriages on pairs of "detached rails resting on moveable chairs, such chairs being "carried on wheels, by which they traverse on cross rails trans-"verse to the line of railway, so as to preserve the detached rails "always at the same level as the rails of the permanent way, "motion being communicated to the chairs by two or more end-"less chains, *which pass over* wheels at each side of the perma-"*nent way and below its* level. The said wheels are put in

" motion by a system of cog wheel, screw, and bevel wheels; " part beneath the platform of the railway, part contained in a " hollow column passing up through the platform, and moved by " hand by a winch, the axle of which passes through the side " of the column."

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1854, March 25.—Nº 697.

BAGOT, Edward.—" Improvements in the manufacture of rails " for railways."

The inventor proposes to " construct each rail of two or more " distinct pieces of iron, to be held together by bolts or screws; " the object being to facilitate the manufacture and renewal of " rails, so that when any one portion, for instance the top, is " worn out, a new piece may be inserted, without disturbing or " discarding the entire rail, as is at present done. The novelty " of the invention consists in the manufacturing of rails in two " or more pieces, instead of rolling them out, as at present, in " one piece from a single pile of iron." He also proposes to " adapt one general principal to the manufacture of rails of every " variety of section, namely, to construct them of two or more " pieces of wrought or rolled iron, so that when put together " the component parts shall form one rail, and preserve the outline of the original, rolled singly, as nearly as circumstances " will admit of."

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1854, March 29.—Nº 722.

BARLOW, Charles.—(*A communication.*)—(*Provisional protection only.*)—" Certain improvements in the permanent way of " railways."

The Patentee constructs " chairs, with ribs or flanges on their " under side, for the purpose of increasing their strength, in addition to those usually employed at the sides," and he employs " metal keys or wedges to fasten the rails into such chairs;" and also places " in the jaws of chairs so constructed or otherwise " blocks or cushions of wood or other elastic substance, to receive " the pressure of the metal keys or wedges," which are slightly indented, notched, or serrated " at the part in contact with the " blocks or cushions;" and he makes " use of wood with the " *fibres placed in* a direction across that in which the keys are " *driven, so that* the pressure may be sustained by them in the

" direction of their length, either for the blocks or cushions or for " keys to hold the rails, or to hold plates of metal against the " rails, which plates in some cases" are placed "in the chair " instead of the metal keys." A pair of chairs are employed " each having a plate or clamp fitting the side of the rails attached " to it, and extending beyond the base on one side and a jaw on " the other," and the rails are secured therein "by forcing the " two chairs together, and the plate or clamp of each chair into " the jaw of the other;" or a pair of plates or clamps made to fit the side of the rails are employed, "each having a jaw at one " end," and the rails are secured "by placing one on each side, " and forcing the end of each plate or clamp into the jaw of the " other; the under side of the plates or clamps" are made "with " a sufficiently wide bearing surface to rest on the sleeper."

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 6.—N° 789.

SMITH, James.—" Improvements in the construction of rail- " ways."

They consist "in making the iron chairs used in constructing " a line of railway with the sleeper combined, which combination" is effected "by having the chair and sleeper cast together. By " such formation of the chair and sleeper a firmer bearing will be " produced, whilst the base of the sleeper is brought nearer to the " upper surface of the ballast."

[Printed, 10*d*. Drawings.]

A.D. 1854, April 8.—N° 828.

KEMP, Henry.—" Certain improvements in the preparation of " wood for planking and sheathing ships and other vessels, also " in house, ship, and pier building, railway sleepers, &c., and all " other purposes whatsoever where wood is required."

The improvements relate to the preparation of wood to be subsequently employed or used for railway sleepers, and works and buildings generally.

" The mode of operating or preparing the wood is to subject it " to the action of sulphate of barytes after calcination with " charcoal, which renders it soluble in water, and sulphate of " copper."

To facilitate the injection or saturation, the wood is punctured by a rolling process.

[Printed, 6d. Drawing.]

A.D. 1854, April 11.—N° 855.

JAMES, WILLIAM HENRY.—"Improvements in marine and "other structures."

These improvements comprise the use of cellular structures made in various ways, of cast or wrought iron, or both, in the construction of a large variety of works, among which are railways. Rails are also to be made in this way both of wrought and cast iron.

[Printed, 6*d*. No Drawings.]

A.D. 1854, April 21.—N° 918.

CAMMELL, CHARLES.—(*Provisional protection only.*)—"Im-"provements in the permanent ways of railways." The invention consists,—

"First, in making the rails for the permanent way of railways "of bars of steel, or iron bars cased with steel, or case-hardened "iron, so as to harden the surface of the rail, and enable it to "resist abrasion and the great wear and tear to which the rails "are now subjected by the heavy traffic that passes over them."

"Secondly, in forming the rails, whether made of steel, iron "bars coated with steel, or case-hardened iron of a peculiar form, "so that when one surface has become worn the rail may be "turned over in order to bring one of the other and unworn "sides uppermost. For this purpose" the rails are made "square "or rectangular in their section, so as to present four equal sides." This rail is secured in a wrought or cast-iron chair affixed by preference to longitudinal sleepers.

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 22.—N° 931.

WARREN, JAMES.—"Improvements in the construction of "railways."

These improvements consist of forming each railway bar with three or four bearing surfaces, so that when one is worn, another may be brought up to become the bearing and wearing surface for the time being. These rails may be made of cast iron, and hollow, with a view to obtain lightness, or they may be made of wrought iron. The bearing surfaces, which for the time being are not in use, offer greater facility for fixing such forms of rails in constructing a railway. In making switches, two rails on either side of a way are combined together on a plate or otherwise; these two rails on either side of a railway come up to and are in gauge at one end with the two lines of railway with which they are to communicate, and at their other end they are capable of being made to range with a single line of way, in some cases using fixed and in other cases moveable guards, and in both cases dispensing with the ordinary moveable facing points heretofore used. In fixing rails in chairs, in some cases wedges are introduced under the rails, to raise and fix them in their chairs.

[Printed, 1*s*. Drawings.]

A.D. 1854, May 3.—N° 996.

POOLE, Moses. — (*A communication.*) — " Improvements in " paving or covering the surfaces of roads, streets, or ways."

The nature of the invention lies " in covering the surface of a " street or way with boxes made of iron, of a circular or other con- " venient form and size divided into sections, which sections are " to be so small as not to admit the hoof of a horse between them, " by compartments of iron, which are so arranged as to strengthen " the whole, and, together with the rim of the boxes, are grooved " in such a manner as will most effectually prevent the feet of " horses or wheels of carriages from slipping. The boxes are " keyed or linked together, and the interstices or sections are to " be filled," say, with a composition of asphalt, or with a composition made of " stone and shells, broken small and mixed with " hydraulic and other cement."

The inventor also claims these improvements as adapted to the construction of a street tramway.

[Printed, 6*d*. Drawing.]

A.D. 1854, May 9.—N° 1033.

ADAMS, William Bridges.—(*Provisional protection only.*)— " Improvements in rails for railways, and modes of connecting " and fixing them."

The improvements consist " in connecting two adjoining bridge " rail ends together by applying two metal side clips, either as " half chairs or brackets, and connecting them by bolts passing " horizontally beneath the rails, with an iron tongue piece enter- " ing the hollow of the bridge rail so adjusted that by the act of " screwing up the bolts the tongue piece will be forced upwards " towards the *crown of the* rail, and the side clips will be forced " *downwards towards the* upper side of the rail flanges; and the

" tongue piece may bear both against the crown of the rail and " the flanges also, or against either of them separately. And in " the case of foot rails, instead of a tongue piece a wedge piece " may be used below the rail. And instead of horizontal bolts " vertical bolts or clips may be used, clipping the tongue piece " or foot piece and passing through the horizontal flanges of " the rail and screwing down thereon, either with side clips or " without; or a plain plate may be used beneath the rail."

Instead of constructing bridge rails in the usual mode the vertical sides may be prolonged downwards below the horizontal bearing flanges, so as to increase the depth of the rail; or the edges of the flanges may be turned down, to increase the stiffness of the flanges, the sleepers being grooved.

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 9.—N° 1036.

LIDDELL, Charles.—" Improvements in the permanent way " of railways."

First, an improved fastening for the joints of rails. The ends of the rails are laid on joint sleepers, " with the joint at or near " the middle of their length, and are secured to them by wrought " angle pieces fitted on each side of the rails, and screwed or " rivetted to the sleepers, and through the rails to each other. " The angle pieces may be either continuous or divided into " three or more parts. The sleepers may be flat or of any form " convenient for the purpose, and the same kind of sleepers and " fastenings may be used for intermediate bearings."

Second, a " new mode of securing double-headed rails to " ordinary sleepers. This is effected by the use of pieces of angle " iron, rolled to fit the sides of the rails, the rails being placed " athwart the sleepers in grooves formed to receive them, and the " angle iron pieces being bolted, spiked, or screwed to the sleepers, " and bolted or rivetted through the rails to each other. For intermediate bearings" it is proposed " to make the angle iron " pieces about six inches long, and for joints about eighteen inches " long; but these lengths may be varied."

[Printed, 10*d*. Drawing.]

A.D. 1854, May 12.—N° 1068.

WESTLEY, William King.—(*Provisional protection only.*)— " *An improved construction of railway and carriages to be em-* " *ployed thereon*, applicable chiefly to farm purposes."

"The chief object of this invention is to produce a cheap temporary railway over which light carriages suitable for carrying " farm and other produce might be run." The railway is proposed to be supported "upon a row of pillars on opposite sides of " which the carriages are intended to run.

"These pillars project through and serve to carry a line of " wood planking to the sides of which iron rails are affixed. " Upon these rails, which form a double way, run the wheels of " the carriages; and for a further support to the carriages, and " to keep them perpendicular, the pillars carry, at their upper " ends a similar arrangement of rails, against the inner face of " which antifriction rollers mounted on the top of the carriages " bear. The carriages may be transferred from one truck to " the other by means of turntables, consisting of a rotating frame " mounted on a pillar for its centre of motion, and carrying upper " and lower rails corresponding to those of the main line. If " thought desirable these may form part of the main line."

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 13.—N° 1074.

GARFORTH, CHARLES. — (*Provisional protection only.*) — " Certain improvements in apparatus to be employed in the construction of the permanent way of railways."

The invention "consists in the application, employment, or " use of a double wedge placed between the rail and the chair, " the inclined surfaces of which shall so operate or act upon each " other as to tighten up the rail in the chair, being independent " of the chair and dependent entirely upon itself for effectively " securing the rail, in lieu of the present wooden keys and other " insecure contrivances. The method of effecting" this "invention is by bringing the two inclined planes of a double wedge " into juxtaposition and by means of a headed screw or bolt " passing through both wedges (the head of the screw or bolt " rest on the base of one wedge and one of two nuts acting on " the base of the outer wedge), to cause the inclined planes to slip " or pass over each other, thereby enlarging the expanse of the " double wedge, and permanently tightening up or securing the " rail in the chair. When such operation has been completed " the first nut may be secured by a second or lock nut in its " position. The *wedges may* either be made of metal or wood, " *or both; or they may* be used separately, of metal or wood, or

" combined, and thus employed in the construction of the per-" manent way of railways."

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 16.—N° 1087.

MILLER, Thomas William.—"Improvements in railway " sleepers."

"This invention has for its object improved arrangements or " constructions of wrought-iron sleepers for railways by employ-" ing plate iron and angle iron, and combining the same, and " uniting the parts by rivets or otherwise."

Various sections of sleepers are shown, as applied both longitudinally and transversely.

" When making longitudinal sleepers . . . . the several " parts of which the same is composed should be so combined " that the ends thereof and the ends of the rails shall not come " together, but that they shall break joint not only in respect to " parts of the longitudinal sleepers themselves, but also in " respect of the rails, by which greater uniformity of strength " will be obtained than when the ends come all opposite the same " place; and these sleepers may be kept apart at their proper " distances by ordinary stretching bolts with collars and nuts or " otherwise."

[Printed, 10*d*. Drawings.]

A.D. 1854, May 16.—N° 1090.

MILLER, Thomas William.—"Improvements in railway " sleepers."

The patentee says "This invention has for its objects improve-" ments in the forms of railway sleepers when wrought iron is " used, and consists of employing certain forms of angle iron, " . . . . . which may be coated with zinc or other matter " to preserve and protect them; and in place of having chairs " fixed thereto, the rails themselves, when of a form to admit of " it, may be fixed to the sleepers by screw bolts and nuts or " otherwise. . . . . . I also make longitudinal railway " sleepers of like forms of rolled wrought-iron bars, but in such " cases I have them rolled as long as I can, and I cause chairs " suitable for the rails used to be fixed thereto by screw bolts and " *nuts or otherwise*; or the rails themselves may, when of a " *convenient form*, be fixed by screw bolts and nuts or other-

" wise to the sleepers, and, when desired, the ends of the several " sleepers may be connected one to the other by fishing pieces, " as is now practised with respect to the ends of rails; and " fixing the rails, whether in chairs or directly to the sleepers " themselves, care should be taken that the ends of the rails " and the ends of the parts of a longitudinal sleeper do not " come opposite each other, and these sleepers may be kept apart " at their proper distances by ordinary stretching bolts with " collars and nuts or otherwise."

[Printed, 1s. 8d. Drawings.]

A.D. 1854, May 19.—N° 1120.

FONTAINEMOREAU, PETER ARMAND le Comte de. — (*A communication.*)—" Improvements in connecting the permanent " rails of railways."

The invention consists " in connecting the permanent rails of " railways by adapting to one side of the joints an iron fish, and " fixing the same by means of a key.

" The object proposed by this invention is to obtain rigidity at " the joints of the rails by fixing them in their chairs in such a " manner that, without opposing any obstacle to their expansion " and contraction, they may have the rigidity of a continuous " rail from one end of the line of railway to the other.

" To effect this in place of a wooden key a cast-iron fish " is employed, " which is kept in its place in the chair by the iron " key, which is interposed between the chair and the fish. The " fish may vary in length. One side of the fish is made to fit " exactly against the rail, so as to press against and support it; " the other side next to the chair is grooved out, so as to allow " the key to fit in between it and the chair. This groove is " terminated at each extremity by a swelling, so as to make the " key when driven home to take a curved form, and thus prevent " its becoming loose. The iron at the head" of the key " is " sufficiently thick to admit of a rectangular hole being made " for the purpose of withdrawing the key when necessary."

[Printed, 1s. Drawings.]

A.D. 1854, May 19.—N° 1121.

GLADSTONE, THOMAS MURRAY. — (*Provisional protection only.*)—" An *improved traverser, or machine for shifting railway " carriages from one set of* rails to another."

The invention "consists in mounting upon suitable bearings, " which are sunk beneath the level of the line of rails four or " more sets of traverser rails, which are connected by an endless " chain or band, and each of which sets, when in the proper posi- " tion, present themselves on a level with the permanent way " The endless chain being worked, causes the shifting traverser " rails to travel over and under or round the bearings upon which " the traverser rails are supported."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 1.—N° 1212.

DUNCAN, DAVID. — "Improvements in railway points or " switches, and crossings."

The "invention consists in a new section of rail. This rail " differs from all others in use by having one side fluted and the " pressure side rolled solid throughout, with a base flange on " either side of the rail, to hold on to the bed of the respective " chairs used in the fitting, to secure the key by forming a lip " with the clasping chair, thus giving a great security to the rail, " and preventing any oscillation; by this section of rail there is " produced all the necessary strength desirable for the pressure " side, and which is a defect to those sections heretofore used, " and is thereby less liable to be crushed and broken down, " and will consequently afford greater security to the traffic " generally, and especially if this said section be used as it can, " may, and is intended to be used, for permanent ways generally, " by which use there will be less liability to accidents, by the " breaking down of the running side of the B and T sections of " rails at present in use, and especially as regards points or " switches and crossings. Itis further intended to give strength " to the crossing by welding a solid piece of hammered iron " to the long point rail, and to plane" the other rail "to the " required angle, which is screwed on forming the V part of the crossing." The V part of the crossing rests with its solid point on one of the wing rail chairs, and its angle on another.

[Printed, 1*s*. Drawings.]

A.D. 1854, June 2.—N° 1222.

GREENSHIELDS, THOMAS. — "Improvements in railway " chairs."

The improvement is effected "by constructing the chair of two " *or more pieces*, that is to say, of a bottom piece or sole of the

" required length and breadth of the chair, and two bracket
" pieces. The bottom piece or sole is to be made thicker at each
" end than in the middle, to form ledges or butments for one end
" of each bracket piece. One face of each bracket piece is made
" to fit half or nearly half the transverse section of the rail; the
" other face of each bracket piece is to rest and slide upon the
" sole; the end of the face resting upon the sole is to be made
" out of square, that is to say, not at a right angle with its side,
" the angle formed by the longest side and the end to be less than
" a right angle. The inside bracket piece is to be fixed upon the
" sole, and secured with screws, bolts, or rivets before the chair
" receives the rail; when the rail is placed in the chair, the other
" or outside bracket piece is placed (and from its construction)
" and when driven up it will draw or tighten against the but-
" ment on the end of the sole and the side of the rail, and must
" be driven up until the rail is clipped or held firmly between the
" bracket pieces; a bolt or pin is then to be passed through the
" bracket pieces and the sole to secure the chair to the sleeper,
" and thus securing the rail firmly in position, and preventing
" the bracket pieces from shifting or becoming slack."

[Printed, 8*d*. Drawing.]

A.D. 1854, June 19.—N° 1327.

HENRY, Louis Ambroise.—" Certain improvements in con-
" structing railroads," consisting,—

" Firstly, of several new or improved kinds or forms of rails,
" being constructed so as to dispense with the ordinary cast-iron
" chairs, wedges, and cross sleepers. A rail is formed like an
" inverted U from skelps of wrought iron, which are thicker in
" the middle than towards the longitudinal edges. The rail has
" a flange at the base for fixing it, by means of bolts and nuts,
" upon cast or wrought-iron plates laid down at suitable dis-
" tances, ... about seventeen inches square. The top of the
" rail has about one inch and three-eighths in thickness, which
" is diminished to seven-eighths of an inch in the flange. The
" plates are also made a little convex, and bent down perpendicu-
" larly on both sides, parallel to the road so as to consolidate the
" ballasting. The rails are kept apart and secured together by
" means of iron rods of about one inch diameter, which are
" bolted *or fixed on the plates*, which are about one yard distant."
This is one type of the inventor's system, but many others are

described, all, however, having a close similarity in the arrangement of plates and ties.

Secondly, of various kinds of railroads for vehicles, called a
" road rail or economical railway. This rail has an oblique flange
" at both edges of the horizontal part, so that the rail may be
" inverted or turned over when one side is worn out. The outer
" flange is for strengthening the rail and retaining the ballast
" upon which they are put. Each line of rails rests on a layer
" of ballast, about one foot wide by eight inches deep. The rails
" are held together by means of plates which are connected by
" hooked rods secured in their places by cotters. These rails are
" slightly convex towards the middle, and an inclination of a
" quarter of an inch is given to the rail for letting the water and
" mud run off."

Many varieties of this method are also shown.

[Printed, 2*s*. Drawings.]

A.D. 1854, June 19.—N° 1329.

ANDERSON, Sir JAMES CALEB.—(*Provisional protection only.*)
—"An economical railway for the conveyance of passengers,
" goods, and letters."

The patentee says, "To work the line I fix high pressure
" engines at such distances as may be found requisite; on the
" top of the chamber which encloses the rails the chimneys of the
" engines are to be placed. The exit steam of each engine is to
" be permitted to escape at a good pressure into its chimney.
" By this arrangement the air in the chamber will be drawn up
" the chimney, and thus a strong current of air will be caused to
" rush into the chamber at the opposite end to that at which the
" engine is at work, and in the direction of the working engine."

" On the rail I place a carriage, the back of which is nearly equal
" to the square of the vertical section of the chamber. The air in
" the front of the carriage being drawn by the exit steam up the
" chimney or chimneys of the working engine or engines, the
" incoming air, by pressing on the back of the carriage, will force
" it forward at a velocity equal to that at which the air in the
" chamber moves, minus the friction."

" As the exit steam will create the current of air required to
" give the motive power, the engine power can be let at profit,
" and thus passengers, goods, and letters can be conveyed con-
" *tinually to the principal* towns of the kingdom without any cost
" *for power.*"

"It will be necessary to put windows to light the chamber when "passengers are to be conveyed."

[Printed, 4d. No Drawings.]

A.D. 1854, June 30.—Nº 1432.

EDWARDS, John.—"Improvements in railway chairs."

Instead of the present form of chair on which the rail rests, and is wedged tightly to prevent it slipping out of its seat, "it is "proposed" to cast or make the chair in two parts, the inner "chap to be loose, with an arm extending a part of the length of "the chair, and dovetailed in the form of a wedge, with a slot to "allow it to move or slide, so that when a chair has to be replaced, the new one can be put or slid under the rail without "disturbing it and the other chairs, and then the inner or separate chap put into its place, and by means of the dovetailed "wedge presses tightly against the rail, preventing the necessity "of loose wedges; and as an additional security the loose chap "is held secure by a screw bolt or similar contrivance, screwing "both parts firmly together; and by the wedge-like form of "the extreme end, where the one part fits into the other more "securely and tightly, the two parts are screwed together the "more firmly; the rail will be wedged without using separate "wedges."

[Printed, 10d. Drawing.]

A.D. 1854, July 4.—Nº 1457.

SUNTER, Joseph.—"New or improved drilling machinery."

The invention consists of a drilling machine placed upon a truck or platform, mounted upon wheels, so that it can readily be transported from place to place. A great number of sets of drills may be used, and the sets of drills may be composed of a greater number than four each. Besides the rotatory motion, the drills have an advancing motion, that is to say, they move in the direction of the axis about which they are rotating. The pinions which engage in the racks on the drill axes for advancing the drills, may be geared together, so that one winch and worm wheel may be sufficient for each set of drills.

The machine is claimed to be calculated for "drilling railway "bars, for fish-jointing the same, as well as for drilling plates "or bars *situated horizontally*."

[Printed, 10d. Drawings.]

A.D. 1854, July 4.—N° 1463.

NEWMAN, James.—" Improvements in the manufacture of " metallic rods, rails, and bars."

The invention consists "in manufacturing metal rods, rails, " and similar forms with a sandy or stony core or centre, with a " view to obtain economy of metal and increased strength. For " this purpose" the patentee takes a "billet or short tube of " metal, ... and one end of this billet being plugged," he rams "it tightly with sand, earth, or analogous material, which " is to be thoroughly dried, after which, the open end of the " billet is to be plugged. This billet is then heated, if requisite, " to a suitable heat, and removed to a train of rolls or a draw " bench, by which it is rolled or drawn out to any reasonable " length."

The patentee proposes to make railway rails by this process.

[Printed, 4*d*. No Drawings.]

A.D. 1854, July 6.—N° 1491.

POLE, William.—" Certain improvements in the construction " of railways."

One of the objects is to increase the strength, durability, and stability of the rails of railway crossings. For this purpose it is proposed to form the points of such crossings by continuing each of the two converging rails completely through to the extremity of the point, and then connecting them firmly together by any suitable means, such as welding bolts or rivets, or the two arms of the point are formed from one rail doubled up upon itself and then fashioned into the proper shape.

"The point thus formed is held fast in its chairs by weighing " it up with transverse keys, which pass through the point and " bear against the chairs. To permit of the economical renewal " of the wing rails and the point double fish chairs" are employed "to form the junctions between them and the continuing rails of the line."

Another object is to lessen the cost and increase the security of what are termed "fish joints" for rails. "In such joints it is " customary to screw the fishing plates together by bolts and nuts " passing through them and the rail." "The improvement is to " '*tap*' *one of* the fishing plates and screw the bolts into it, by " *which means the* cost of the nuts and of a certain length of the " *bolts will be saved,* and the tendency of the bolts to become loose

" will be reduced; or if the nuts be added, they serve as setting " nuts, by which the bolts are secured still more firmly."

[Printed, 10*d*. Drawing.]

A.D. 1854, July 15.—N° 1558.

WRIGHT, THOMAS.—" Improvements in the permanent way of " railways."

" The feature of this invention is, that a single sleeper is made " to form a complete roadway, which is made in one entire mas- " sive piece or casting, in order to sustain the two collateral rails " upon one and the same sleeper without jointings, either longi- " tudinally or transversely. . . . . Timber, felt, or any other " suitable substance may be interposed between the joints of the " sleepers, as well as underneath and on the sides of the rail " seatings, and between the rail and sleeper. Any known shape " of rail or loose chair may be secured to the top flange of the " sleeper, either with or without soft or rigidity neutralising sub- " stances intervening."

Tubular longitudinal sleepers are also cast uncombined and are tied by wrought iron tie bars.

" The improved forms of rails consist of a perfectly square bar " rail, a tyre bar rail, and a dovetailed rail: and the improved " mode of holding the same consists in the employment of a vice " jaw fastening, the rail being held between a fixed lug cast on or " attached to the sleeper, and a moveable piece, acting like a vice " jaw, and tightening up by means of bolts and nuts, passing " under or through the rail."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1854, July 15.—N° 1559.

ASHWORTH, JOHN.—" Certain improvements in apparatus to " be employed in the construction of the permanent way of rail- " ways."

" The improvement consists in the application, employment, or " use of a plate, ... or bar of iron, or any other suitable " material, the sides of which shall correspond with the re- " spective surfaces of the chair and rail or rails between which " it may be placed, such plate, or portion of plate, or bar, being " adjusted or 'tightened up' by means of a screw or screws " passing through one side of the chair, and bearing against the " *plate or portion of plate*, or bar, in which is drilled or otherwise " *sunk a hole or holes* or perforation, thereby (when the rail is

" tightened up), and by the use of a lock nut, permanently " securing the plate or bar, and preventing any lateral or other " shifting. . . . . In lieu of tapping or screwing through the " entire side of the chair it may be desirable to cast the chair with " a recess on the interior on the side for the screw, wherein a " block or nut may be dropped, and considerable saving in the " screwing or tapping of the chair be effected, as the nut only will " require to be cut." The bar or plate thus constitutes a metallic key.

[Printed, 10*d*. Drawing.]

A.D. 1854, July 27.—N° 1660.

MILLER, NATHANIEL and GRAHAM, ROBERT,—(*Provisional protection only.*)—" Certain improvements in the construction of " certain parts of the permanent way of railway, commonly called " crossings."

It is proposed to " employ a solid block or 'crossing piece' of " metal, tapered as required, and bolted at its apex to its side " rails, with intervening space occupied by small blocks or " wedges, preserving the proper space between the side rails and " centre block, and the said wedges, plates, or blocks so placed as " to be below the action or passage of the tyre of the wheel, having " bolts properly secured and passing through the whole. The " base or broad end of the solid block or 'crossing piece' receives " against it the entire section of the two rails (neither of which " are tapered), besides being furnished with a tongue-piece, which " fully occupies and passes some distance into and between the " hollowed out portion of the side of the rails. As the rails con- " verge to a point, the tongue piece of the solid block between the " rails (to occupy its proper space) must assume a wedge shape " when such respective parts are bolted together with the aid of " 'fish' pieces or plates. On each side of the rail a joint will be " formed, perfectly rigid and firm, and by a peculiar arrangement " of the chairs, as well as the method employed in securing the " apex of the block, all danger from the depression, elevation, or " lateral shifting of the 'crossing' will be entirely prevented."

[Printed, 4*d*. No Drawings.]

A.D. 1854, July 29.—N° 1674.

SMITH, *WILLIAM* HENRY.—(*Provisional* protection *only.*)— " *Certain improvements* in the permanent way of railways."

"The invention consists, in the use of a chair formed in two
" parts, adapted to each other so as to form a kind of joint, the
" pressure of the rail with the superincumbent weight causing
" the jaws or upper parts of the chair to clip the rail firmly
" between them. In case it should be found desirable, a wedge
" or spike may be inserted between the two parts of the chair, just
" underneath the joint, for the purpose of keeping the parts of
" the chair closer against the rail. The ordinary key may be dispensed with, and a strip of yielding material may be inserted
" on one or both sides of the rail, or within a recess formed in
" the inside of the chair. The chair may be cast hollow in the
" base if preferred.

"The invention also consists in the use of a rail formed with
" three or more heads or bearing surfaces, so that when one is
" worn the rail may be turned and another presented for use."

It further consists "in forming openings in the side of such
" rails; or combined chairs and sleepers, to which the plan may
" be applicable," the openings being intended to admit the packing tool, to facilitate the packing with ballast.

[Printed, 4*d*. No Drawings.]

A.D. 1854, August 23.—N° 1852.

YOUNG, James Hadden.—" Improvements in the construction
" of railways."

The invention consists in so " constructing a railway as to take
" advantage of the tensile property of the iron used, in place of
" simply depending, as at present, on the property which the
" rails have to resist bending, for which purpose the rods or wires
" used are kept in a state of tension by being stretched over
" posts, sleepers, or other fixtures, according to the inequalities
" of the ground, the two end posts which hold the wire in tension
" being securely fixed in the ground, whilst the intermediate
" posts may be less firmly secured, as they only serve to steady
" the rods or wires. On these stretched rods or wires " the
vehicles are proposed to run, " as on the rails in ordinary use.
" Besides the usual flange to the wheels," guide wheels are fixed
" to the vehicle, to prevent it going off the rods or wires."

[Printed, 10*d*. Drawing.]

A.D. 1854, August 25.—N° 1866.

SKINNER, James Thomas.—(*Provisional protection only.*)—
" *Improved apparatus for* rendering the shunts or points of rail-

" ways self-acting, applicable also to the working of railway " signals.

" The locomotive engine is provided with a bar or lever, which " shall act as a wedge, and when set for that purpose strike against " a bowle, carried by a sliding plate, situate between the rails of a " line of railway, and impart a sliding motion to that plate, which " motion, by the connection of the plate with the shunts, will be " communicated thereto."

" A weighted vertical bell crank lever " is employed " for keeping the shunts in the position which leaves the main line open, " and by means of a pair of horizontal bell crank levers and connecting rods " the lateral movement required is given to the shunts or points for turning the engine off the line of rails on which it is running."

The engine is furnished with a " wedge bar, which may be " raised or lowered at pleasure by the engine driver. When in " its raised position the engine will pass the sliding plate without " acting upon it; but when the wedge bar is lowered, its inclined " edge will press against the friction bowle of the sliding plate, " and bring the shunts into position in time for the fore wheels " of the engine to pass over them."

[Printed, 4*d*. No Drawings.]

A.D. 1854, September 5.—N° 1941.

BARNES, William.—(*Provisional protection only.*)—" Improvements in fastening rails of railways."

" The invention consists in fastening the rails of railways by " the use of plugs inserted into their ends. For this purpose " a hole is drilled " in a line with the length of the rail, of the " diameter and depth suitable to the plug to be used; ths plug is " then inserted into the end of each of two lengths of rail, and " the ends being brought together the fastening is complete."

[Printed, 4*d*. No Drawings.]

A.D. 1854, October 5.—N° 2140.

ADAMS, William Bridges.—" Improvements in rails for " railways and in the connections and fastenings for rails."

The improvements are as follows :—

In the sectional forms of bridge rails, by deepening the vertical sides below the level of the horizontal flanges or bearing surfaces, so as to make the rails vertically stiffer.

In turning down the edges of the horizontal flanges, so as to make such flanges vertically stiffer.

In forming the vertical projecting portions below the horizontal bearing flanges of bridge rails at acute or obtuse angles instead of right angles, for the purpose of better jointing or connecting the rails together.

In forming the lower or bearing portions of bridge rails and also of foot rails to angular instead of horizontal section, for the purpose of better jointing or connecting the rails together.

In forming the bearing flanges placed at the mid-depth of girder rails of a wedging form, for the purpose of better jointing or connecting, and in forming central flanges on double-headed rails between the upper and lower tables.

In jointing or connecting bridge rails together by means of what is called a truss joint.

In jointing or connecting girder rails by bracket or clip joints.

Applying the clip or bracket joints, when required, by reducing in width the horizontal bearing flanges of any of the above-described rails.

Peculiar formed chairs or brackets of wood or metal to support the intermediate portions of rails.

[Printed, 10*d*. Drawing.]

A.D. 1854, October 10.—N° 2162.

CROSSKILL, WILLIAM.—" Improvements in the construction " of portable railways."

Under this patent the inventor claims :—

First, " the construction of railways in frames or lengths, having " the longitudinal sleepers and rails connected to the cross " sleepers in such manner that each length or frame can be folded " together for transport or shipment without being taken to " pieces."

Secondly, " the connecting together the ends of the longi- " tudinal sleepers and rails of the frames or lengths by means of " loose transverse sleepers having loops or chairs fixed upon " them to receive those ends, and to which they may be fastened " by pins, bolts, or any convenient means."

Thirdly, " the making of the longitudinal sleepers and rails for " railways of two or more different lengths, capable of being " *arranged so that when* the long and short lengths are laid " *down alternately* on each side, the railway shall form a straight

" line, but so that when some or all of the long sleepers and rails " are laid down on one side, and some or all of the short ones on " the opposite side, the railway shall form a curve."

Fourthly, a construction of rail for " the purpose of enabling " carriages or vehicles having either wheels with flanged tires or " wheels with flat tires to travel upon the same railway."

Fifthly, an arrangement of two angle bars for a like purpose.

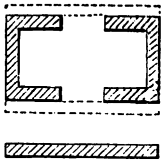
[Printed, 1*s*. Drawings.]

A.D. 1854, October 23.—N° 2257.

SIMMONS, George.—(*Provisional protection only.*)—" Improve- " ments in the construction of railway bearers and sleepers."

" This invention consists of constructing hollow railway bearers " and sleepers of wrought iron of the following forms combined " together:—

" Two angle irons of the sectional form



" are combined with plates at the top and bottom by rivets or " bolts, or by the rails of a railway."

[Printed, 4*d*. Woodcut.]

A.D. 1854, November 13.—N° 2402.

ARMSTRONG, Joseph.—" Certain improvements in chairs and " crossings for the permanent way of railways." This invention has for its object " a more efficient mode than heretofore practised " of securing the crossing rails employed for directing and guid- " ing a train of railway carriages from one line of rails to " another."

The feature of novelty consists " in forming several chairs in " one piece of metal, constituting a compound chair, instead of " employing separate chairs; and in arranging the bearing parts " thereof . . . . at suitable distances asunder, and connecting " such parts all together by casting them with the base plate, " thereby forming one entire casting, by the use and employment " of which a considerably larger amount bearing surface for the " rails is obtained, and consequently more solidity and durability "of the crossing rails than if single or separate chairs were "employed as commonly practised; and, secondly, in forming "the middle portion of the said compound chair in such manner "and of such shape as that the flanches of the wheels of the "carriages bear slightly thereon, for the purpose of preventing "the point of the crossing from becoming worn, as is now the "case, and by which the even surface of such said part becomes "soon destroyed, and the point thereby rendered useless."

[Printed, 6*d*. Drawing.]

A.D. 1854, November 23.—Nº 2469.

HURST, WILLIAM.—(*Provisional protection only.*)—"Improve-"ments in railway chairs."

The nature of the invention "consists in rolling iron of a "peculiar shape, and in cutting the iron thus rolled into pieces "of suitable length to make railway chairs. The chair thus "made has a bottom plate, which is fastened to the sleeper in the "ordinary manner, and a projecting flange for supporting a double-"headed rail, or rail of other suitable shape. These chairs are "particularly applicable in those places where the rails are jointed, "the end of each rail being secured to the flange of the chair by "bolts and by a fish plate; they may, however, be used as inter-"mediate chairs. Instead of rolling the iron, the required shape "may be given to the flange against which the rail is fixed by "stamping by or pressure."

[Printed, 4*d*. No Drawings.]

A.D. 1854, November 30.—Nº 2514.

ANDERSON, Sir JAMES CALEB.—(*Provisional protection only.*) —"An economical railway for the conveyance of passengers, "goods, and letters."

The patentee says:—"To work the line I fix high pressure "engines at such distances as may be found requisite. On the "top of the chamber which encloses the rails the chimneys of "the engines are to be placed. The exit steam of each engine "is to be permitted to escape at a good pressure into its chimney. "By this arrangement the air in the chamber will be drawn up "the chimney, and thus a strong current of air will be caused "to rush into the chamber at the opposite end to that at which "the engine is at work, and in the direction of the working "*engines*."

"On the rail I place a carriage, the back of which is nearly " equal to the square of the vertical section of the chamber. The " air in the front of the carriage being drawn by the exit steam " up the chimney or chimneys of the working engine or engines, " the incoming air, by pressing on the back of the carriage, will " force it forward at a velocity equal to that at which the air in " the chamber moves, minus the friction."

"As the exit steam will create the current of air required to " give the motive power, the engine power can be let at profit, " and thus passengers, goods, and letters, can be conveyed con- " tinually to the principal towns of the kingdom without any " cost for power."

"It will be necessary to put windows to light the chambers " when passengers are to be conveyed."

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 2.—Nº 2536.

BAZAINE, Dominique.—"An improved system of railway, " applicable especially on common roads."

"It consists in wrought-iron rails, of a particular shape, pro- " vided with a wheel rut, and a counter rail at the top, for the " passage of the flange at the rim of the wheel. These rails rest " on cast-iron chairs, which chairs are riveted on wrought-iron " cross sleepers or merely made fast to stone blocks. The cast- " iron chairs may also be made fast to cross sleepers of wood." Square plates of cast iron may be used instead of stone blocks.

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1854, December 23.—Nº 2718.

HENFREY, Charles.—(*A communication from Pasquale Delorenzi.*)—"Improvements in the construction of railways for steep " gradients, and in the machinery or apparatus employed therein " or connected therewith."

"The improvements consist in the utilizing or employing of " water as a propelling force, in which a stream of water is " directed down the line of railway in one or more channels or " ducts, situated either between the rails or on each or either " side of the same, and acting upon a locomotive water wheel " or wheels, or other locomotive hydraulic mechanism attached " to the locomotive. The locomotive to be employed on this " description of railway may consist of one or more water

" wheels, the floats of which are wholly or partially submerged in " the descending body or stream of water flowing in the channel " or channels, and receive a rotatory motion therefrom."

The patentee says, "It is obvious that the same power which " facilitates the ascent of steep gradients will answer equally well " as a retarding force in descending such gradients, as the weight " of the descending body of water will act upon the floats of the " water wheel or wheels, and tend to turn such wheels round in a " contrary direction to the motion of the train."

The paddles are capable of being feathered or adjusted.

[Printed, 1*s*. Drawings.]

A.D. 1854, December 30.—N° 2760.

NORTH, ROBERT SAM.—" Improvements in switches and cross-" ings for railways."

These improvements are described as follows by the inventor himself in the words of his claim,—

" First, a block of cast, wrought, or cast malleable iron or " steel as a foundation, of a peculiar form, to which I attach the " point, point rails, and wing rails, so that the crossing is almost " rendered as firm as though it were one solid piece, with this " advantage, that the point and wing rails can be changed four " times, and that each and every part can be changed, replaced or " turned separately or altogether without disturbing the crossing."

" Secondly, making the wing rails and check rails exactly alike, " that when the wing rails are worn out, by being turned four " times, the check rails may be then put on and turned four " times, in like manner; the worn out wing rails acting as check " rails. I accomplish this by making both ends of the wing and " check rails the same length from the bend, and they may be " either fished or connected at the joint by a similar chair to the " heel chair, or an ordinary joint chair, or otherwise, as may be " preferred."

" Thirdly, the manner in which each piece is attached; the " foundation, and also the manner in which the point and point " rails are tightened into their places."

" Fourthly, an improved section of stock and switch rail, so " that when one side of either switch or stock rail is injured or " worn, they may be reversed."

" *Fifthly, an improved* heel joint or middle chair constructed " *to do away with wood* keys, at the same time allowing the rail

" to be taken out easily by merely slackening the bolt, the bolt " having no strain on it when a train is passing over."

[Printed, 10*d.* Drawing.]

1855.

A.D. 1855, January 12.—N° 88.

BARNINGHAM, William.—" Improvements in connecting the " rails of railways."

" The object of the invention is to afford a large bearing surface " for, and a secure connection of, the ends of railway rails. The " improved chair, by which the rails are supported and connected " at their joint, is put together in two halves, the joint being " under and in a line with the rail." The chair is made " long " enough to reach on to two sleepers when the same are placed " at the usual distance apart," and the two halves of the chair are bolted together, " either through the metal which fits between " the head and lower portion of the rail or under the rail, as may " be found more convenient. The chairs are fixed to the sleepers " by spikes or treenails in the usual manner, or the chairs may be " made of wrought iron in one piece, instead of bolting them " together in two halves."

[Printed, 8*d.* Drawing.]

A.D. 1855, January 22.—N° 164.

CARR, Henry.—" Certain improvements in railway crossings."

The inventor constructs railway crossings with the point, the " distance pieces between the wing rails, and the bed of the crossing which rests upon the sleepers or chairs, of one solid piece of " metal, which piece is somewhat similar to, and partly answers " the purpose of the cast crossing called in America the frog." The wing rails are formed of the " common rails according to the " section used on the line of railway to which the crossing is " applied. These wing rails are brought forward on each side of " the solid point, and attached to it by means of bolts, keys, or " similar fastenings, the object being thoroughly to unite the " solid point with the ring rails."

[Printed, 6d. Drawing.]

A.D. 1855, January 23.—N° 172.

COATES, John.—" Improvements in railways."

The invention refers to the joining or supporting of rails. The chair is cast so that " one side of the cored part thereof is of a " form corresponding to the section of the rail, a space being left " on the other side for the reception of a block, also corresponding " to the said section. This block is provided with a groove, in " which a key or wedge is placed, a portion thereof also projecting " into the chair. Upon the key or wedge therefore being driven " up, the block will be pressed firmly against the rail or rails, so " as to confine them between it and the cored part of the chair. " In order to prevent a longitudinal motion of the block " a projection is formed thereon, " which drops into a recess formed " in the bottom of the chair." The invention also refers to the " application of screws or nuts for preventing the keys or wedges " of railway chairs from 'drawing.' Thus upon the end of the " key or wedge," a screw is formed " which projects beyond the " chair," and it is kept drawn forward by means of a nut or nuts; or the side of the chair is tapped, and a screw therein is caused to bear against the key or wedge.

[Printed, 6*d*. Drawing.]

A.D. 1855, February 8.—N° 300.

ARMSTRONG, Joseph.—(*Provisional protection only.*)—" Im- " provements in certain parts of the permanent way of railways."

Connecting by their ends the rails of railways. Those chairs which are to support the rails at their points of junction are formed considerably longer than usual, " and with a taper opening " through the same, of corresponding shape to the section of the " rail which is to be held thereby, and into such said opening " a wedge is fitted " the inner surface of which is of corresponding " shape to the sides and head of the rails," and the outer surface is formed taper and of corresponding shape to the taper opening in the chair, and the thickest end of the wedge is formed with a flanch, in which are formed holes through which are passed the screwed ends of two wrought-iron bolts, " the barrels and heads " of which are securely held by holes formed through the chair in " the direction of its length and at opposite sides thereof; said " hollow wedge being connected to the chair and rails by nuts " *passed upon the screwed* ends of the before-mentioned bolts, so " *that as the said nuts* are tightened up, the hollow taper wedge

" will be forcibly pressed against the sides of the two rails, and " thus hold then firm and steady, and preserve their points of " junction in a line with the top of the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 21.—N° 379.

TELLE, Julien Aimable. — (*Provisional protection only.*)— " A system of railways to be used in the interior of cities and " towns."

"The invention relates to several improved modes for establishing railways in streets of towns without obstructing the " thoroughfares or otherwise interfering with public circulation." This is effected "by making through the quarters through which " the railway is to pass a deep cutting," in which is laid down " one or several lines of rail as may be desired. Along this cutting" is built " on one or both sides a row of houses which " come close to the railway, in such manner that they may be " used for letting passengers get in and out, and for loading and " unloading the goods. The railway when not laid down in a " cutting as described is supported at a suitable elevation above " the level of the street on a succession of arches, by means of " which the smaller crossings are effected, the larger ones, such " as main streets, canals, &c., requiring bridges."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 21.—N° 389.

PRINCE, Paul.—" An improvement in the patterns employed " in making moulds for railway chairs."

" This invention consists of making each pattern of a railway " chair of two parts connected by a hinge or axis, by which, when " a mould has been formed on the pattern, one part of the pattern " may be caused to move on its axis, and thus admit of the " pattern being more conveniently taken from the mould."

[Printed, 10*d*. Drawing.]

A.D. 1855, March 26.—N° 658.

NORTH, Robert Sam.—(*Provisional protection only.*)—" Im" provements in the permanent way and sidings of railways."

The invention consists—

"*Firstly, in* making the rails in two or more parts longitudinally, " *and bolting them* firmly together so as to form a continuous *ail.*"

"Secondly, in making that part of the rail on which the wheels
" run of such a shape as to suit exactly the periphery of the
" wheels, by which splitting or laminating of the flanges is pre-
" vented." And also in giving "a continuous support under the
" flange of the rail by means of angular pieces, which form a
" continuous chair or support to the rail; by this plan of making
" the rails in parts, that portion which is worn or damaged can
" be removed, and a fresh piece replaced without removing the
" other parts."

"Thirdly, in making the rail itself form a stop block, by causing
" a part of it to rise on a pivot, and thus allow any carriage or
" waggon to enter the siding, but not to leave it until allowed
" to do so by the person in charge of the siding."

"Fourthly, in making the sleepers for the rails to rest upon
" transversely, and of iron or other suitable metal."

[Printed, 4*d*. No Drawings.]

A.D. 1855, March 28.—N° 682.

PERRING, JOHN SHAE.—"Improvements in the permanent
" way of railways."

The invention relates, "firstly, to a method of constructing the
" chairs of railways, and of applying them to sleepers." The
chair is formed in two parts, "one of which is provided with a
" bed plate or plates, by which it is attached to the sleeper or
" sleepers; the other part forms a clip or loose cheek, which is
" drawn forcibly towards the other, clipping the rail between
" them by means of bolts, keys, or other such apparatus. The
" two portions of the chair extend downward, and in that situa-
" tion bear against each other.

"Secondly, to the construction of railway crossings, the points
" or tongues of which" are constructed "in such manner that
" both sides are alike and fit them into chairs, so that when
" one side or surface is worn out they can be turned over and
" used again."

[Printed, 10*d*. Drawing.]

A.D. 1855, April 14.—N° 825.

ARMSTRONG, JOSEPH, and LIVINGSTON, JOHN.—(*Provisional protection only.*)—" *Improvements in certain parts of the*
" *permanent way of railways.*"

The improvements are designed "for the purpose of dispensing "with the use of 'switches' or 'points' as heretofore constructed "and employed on railways. The mode commonly practised "has been to plane them to a taper point, and the object of these "improvements is to obviate the necessity for pointing such "parts," by substituting the following arrangement:—

At the crossing a pair of sliding rails is placed, "formed either "single or double headed," and each pair is connected securely together at such distances asunder "that the flanges of the "wheels of the carriages may pass clear between them; and that "one end of such sliding rails corresponds with the butt ends of "the crossing and main rails of the permanent way, and the other "end of the butt ends of one of the rails of each such pair corresponds with the butt ends of the rails of the main line only; "and it is at this particular juncture that the action of the sliding "rails takes place, so as to present one or other of the ends "thereof opposite to those of the main rails, whilst the opposite "ends of the sliding rails are securely connected by 'fishing' or "otherwise to the fixed rails which form the crossing and the "main line. An important feature in these improvements consists in rendering the aforesaid sliding rails self-acting, which "is effected by the use and employment of two check rails or bars "securely fixed to the sleepers of the permanent way between "the inner pair of the aforesaid sliding rails. The ends of these "check rails or bars are curved inwards, and are so fixed with "respect to the main rails as that the straight part of such check "rails allow the flanges of the wheels of the carriages to pass "between them and the side of one or other of the sliding rails, "according to the position such said rails occupy with respect to "the fixed rails."

[Printed, 4*d*. No Drawings.]

A.D. 1855, April 16.—N° 832.

ORDISH, Rowland Mason.—(*Provisional protection only.*)— "Certain improvements in the permanent way of railways."

The invention consists in constructing bridge rails "with their "flanges bent down into a perpendicular or inclined position at "the intermediate parts, by which means a much greater depth is "obtained at those parts, the strength of the rail is increased. "The strength is still farther increased by rolling the rails with "*a beading or thick* edge to each flange. A clip or bolt may be "*employed to confine* the flanges and prevent them from spread-

" ing. These rails, which may be called fish-bellied bridge rails, " may be rolled in the ordinary manner, and afterwards shaped " or pressed to the required form by dies or rollers, or otherwise. " These rails, which may be called fish-bellied rails, may be rolled " in the ordinary manner, and afterwards shaped or pressed to " the required form by dies or rollers, or otherwise."

[Printed, 4*d.* No Drawings.]

A.D. 1855, April 18.—N° 849.

WOODHOUSE, Henry.—" Improvements in the construction " of crossings for the permanent way of railways."

The object of the invention is so to construct the rails of crossings that when one part of the wing rail is worn away the rail may be reversed, so as to bring another portion of the same rail in the place that had been worn away; also in substituting the check rails for the wing rails, and using them in the same way, the injured wing rails being put in the place of the check rails; for this purpose the bend of the wing rails and check rails must be made equal.

[Printed, 6*d.* Drawing.]

A.D. 1855, April 24.—N° 916.

MUIR, Matthew Andrew.—" Improvements in the manufac- " ture or moulding of railway chairs."

"The invention relates to the manufacture or moulding of " railway chairs. One or more chairs may be moulded and cast " in one box; but when two chairs are moulded in one box, the " pattern chairs which are preferably formed of metal, are com- " bined according to one modification with a transverse saddle " piece, the whole being so contrived as to give all the accuracy " due to the use of chill plates whilst the latter are dispensed " with." Each saddle or supporting piece is formed with projections, feathers, or recesses for determining the position of the core pieces for forming the open jaw portion of the chair, the core pieces being formed with corresponding recesses, feathers, or projections.

The chairs are cast with the spike holes rounded off at their bottom edges.

[Printed, 10*d.* Drawing.]

A.D. 1855, May 1.—No. 972.

HUNT, Thomas.—(*Provisional protection only.*)—" Improve- " *ments in the permanent ways of railways.*"

"The improvements relate to forming the rail by dividing its " sectional area or breadth and through its whole length into two " or more separate parts, which parts when put together form a " compound rail," which enables the inventor, " when laying " such rails, to place these parts or lengths so as to break joint " with each other; and such parts or lengths, when so fixed by " keying, screwing, or as may be otherwise arranged, will be held " compactly together. The longitudinal and sectional division " of the rails may be continued through the entire depth of the " rail, or only partially so, according to the sectional form of rail " employed, or as circumstances may indicate." When the double-headed rail is used, longitudinal recesses are made, forming an internal chamber, which may serve for the introduction of steadying pieces.

[Printed, 4*d*. No Drawings.]

A.D. 1855, May 23.—N° 1161.

DAVIS, David L.—" An improved method of applying elastic " bearings to railroad chairs and rails."

The improved method lies " in confining the india-rubber " between plates upon every side in such a manner that while it " shall be free to yield in a vertical direction it shall be subjected " to no friction between the surfaces above and below it, by which " means the india-rubber is protected from the abrasion which " has heretofore so speedily destroyed it."

[Printed, 8*d*. Drawing.]

A.D. 1855, May 28.—N° 1213.

MORRISON, John.—"A new mode of constructing railways " specially intended to be employed for the transit of carriages or " vehicles moved or propelled by human power."

The invention consists—

" Firstly, in so constructing a double line of rails as that it shall " present an uneven or undulating surface for the wheels or " carriages or vehicles moved or propelled by human power to " run upon, instead of laying the rails as nearly level as is compatible with the uneven natural surface of the ground selected " for the construction of the line, as heretofore practised in the " construction of railways upon which locomotive engines are " employed."

"*And, secondly,* in the use and employment of four wheel car" *riages or vehicles* of similar construction to those extensively

" used on common roads, and well known by the name of pedo-
" motive and manumotive carriages, from the circumstance of
" their being moved or propelled by the hands or feet of the
" person to be carried."

[Printed, 8*d.* Drawing.]

A.D. 1855, June 2.—N° 1260.

TAYLOR, JAMES, and SMITH, WILLIAM.—(*Provisional protection only.*)—" Improvements in the chairs of railways."

The invention " consists of making a joint and middle chair
" with one jaw, and in the place of the ordinary wood key to fix a
" loose piece of iron by means of bolts or cotters; also of mak-
" ing a chair in two parts, with a jaw on each part, the joint of
" the two parts pressing transversely under the rail, both pieces
" being bolted together at each end." The object of the improvements is to dispense with the wood keys.

[Printed, 4*d.* No Drawings.]

A.D. 1855, June 5.—N° 1286.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—(*Provisional protection only.*)—" Improved machinery for rolling bar
" iron."

" The principal object of this invention is to roll railroad rails
" with three treads or wearing surfaces, so that, as the surfaces
" become worn, by simply turning the rail one third around, a
" second new surface will be presented, and when that is worn a
" third surface will be presented, the two surfaces which are not
" employed as a tread forming at any time a broad base for the
" support of the rail or bar. Such rails with three threads, both
" for economy of iron and to facilitate the securing of them to
" the cross ties, should be formed with each part like the ordi-
" nary T rail, as it is technically termed, the union of the three
" presenting three grooves or channels which cannot be rolled
" by any form of projections on either two or four rollers, nor by
" three rollers, unless their axis be arranged in a peculiar manner."

" To accomplish the result specified, this invention consists in
" the employment of three rollers with their axis arranged in the
" lines of an equilateral triangle, so geared as to rotate with equal
" velocities, and each having a projecting fillet to produce one of
" the grooves between two of the rails or treads and the periphery,
" each side of the fillet being so shaped as to produce the form of
" one half of two of the rails. The die rollers are constituted in

" the form of double cones, the pressing surfaces which form the " rails being at or near the middle of the rollers, which, in order to " ensure accuracy and steadiness, are all geared together in a " peculiar manner.

" Both the conical surfaces of each roller are provided with " teeth, so that each roller is made to gear into and work with the " other two. By this means not only steadiness of working is " ensured but any undue strain on the gearing is prevented."

[Printed, 4*d*. No Drawings.]

A.D. 1855, June 6.—Nº 1297.

BAINES, William.—" Improvements in certain parts of rail- " ways, and for the methods of manufacturing and constructing " part of the same."

" The switches have an extra thickness formed or left on the " upper or top part of their outer sides, commencing at or near " that part of the tongue against which the flange of the wheel " begins to press, and extending as far as additional strength is re- " quired, and bending or projecting outwards, to which the adjacent " rails are made comformable; and in order to give the point rails " a broad and strong base in cases where it is required." The Patentee forms on " their inner sides grooves or projections, to " which are secured blocks or brackets bearing on the surface " of the chairs; and to keep the surfaces lubricated, the blocks " or the chairs are chambered or hollowed to receive a sponge or " other substance for retaining lubricating matter, which by the " movement of the switch tongue is conveyed to and spread over " the rubbing surface; and each switch chair has one or more " raised surfaces, formed on one or both sides of its inner jaw, " which by their construction enable the tongue when sliding over " them to clear away every obstruction that might fall between it " and the main rail; and " which are applicable to switch tongues " of less depth than the main rail, and the chair is so formed as " to prevent the tongue from rising; and a spring is attached to " an apparatus for effectually closing the point of the bars or " plates which form the tapered part of the crossing. The small " end or point takes a vertical bearing from projections or channels " on each side, which afford it a firm support, and the broad end " is attached to the main rail either by joint plates fitting into " the side channels and held in their place by the wing rail, or " *by a scarf or* half lap joints, and secured by bolts or rivets."

[Printed, 10d. Drawing.]

A.D. 1855, June 11.—N° 1331.

BARRINGTON, William, and LE FANU, William Richard.—(*Provisional protection only.*)—" An improved mode of joining " 'bridge rails' in the permanent way of railway by means of a " fish piece."

"The piece of iron or flesh is placed in the hollow part or interior " of the rail, and one end or portion of it is rivetted or otherwise " firmly secured to one length of rail, and the other end or " portion of it is firmly bolted or otherwise fixed to the other " length of rail, the bolts running horizontally through the piece " of iron or 'fish' and the rail on each side of it."

"The ends of the lengths of rail are laid close together, except " at about every third or fourth joint, where provision is made in " the 'fish piece' for the expansion or counteraction of the rails, " by having the holes in the 'fish' piece made oval, so as to " allow a certain amount of play to the bolts or rivets.

[Printed, 4*d*. No Drawings.]

A.D. 1855, June 12.—N° 1336.

LIEBISCH, John Joseph.—" Improvements in rails for rail- " ways."

The invention consists in "making each rail in two parts, the " bottom part having a groove longitudinally, and the top part " fitting into the said groove. The bottom part of the rails, being " laid on sleepers transverse or longitudinal, may be fastened to " them either with or without chairs;" the Patentee does not doubt that " in practice they will be found unnecessary, as there " will never be a joint completely through the rail, the top parts " being so placed that their ends will join about the centres of " the bottom parts, thus forming a solid continuous rail; and to " prevent the top parts lifting out of the grooves" screw bolts or pins are put through both parts transversely.

[Printed, 8*d*. Drawing.]

A.D. 1855, June 12.—N° 1344.

BRANT, John Charles.—" Improvements in laying rails, " chairs, and sleepers for the permanent way of railways."

. This invention consists "in the application of cork of any " necessary *substance in various ways to the permanent way of* " *railways; also of using* longitudinal and transverse sleepers

" tied together so as to form a continuous line of way on a solid " and equal bearing. By this method of connecting the longitudinal with the transverse sleepers a great saving is effected in " labour, chairs, and sleepers; the longitudinal sleepers taking " the place of four transverse ones, and the upper part of the " longitudinal sleeper being covered with cork, attached by means " of marine glue or otherwise."

Several forms of chairs are also described, one of which is dovetailed into the sleeper. Another clips the sleeper and has bolts passed through the sides and sleeper.

[Printed, 6*d*. Drawing.]

A.D. 1855, June 15.—N° 1366.

CLAY, William.—" The application of certain descriptions of " bar iron to purposes where great strength or stiffness is " required."

" Bar iron of angular, concave, convex, and other sectional " forms, such as T iron, trough or channel iron, and double T " iron, has been used for various purposes, such as for bracing or " strengthening wooden or other structures, but it has hitherto " been rolled with parallel sides, that is, of the same section " throughout. Now, the present invention relates to the application of this kind of bar iron, after being rolled to a taper form, " to various purposes where strength and stiffness are required."

It is intended to use the improved taper bar iron " for ships' " knees, beams for ships, or other structures, corner pieces for " railway waggons, or any wooden structure where two pieces or " beams of wood are mortised or attached to each other, and " form an angle or corner. Bar iron made in this manner may " also be employed for wrought-iron beams or girders, or ribs for " wooden or iron ships, and also for making wrought-iron spokes " for railway wheels."

[Printed, 6*d*. Drawing.]

A.D. 1855, June 26.—N° 1461.

POUILLET, Charles Marie.—(*Provisional protection only.*)— " Certain improvements in railways."

" The invention consists, first, in the employment, in the construction of the permanent way of railways, of sleepers supported upon and fixed to what is termed pressure tables or " bearers and of cast-iron chairs."

"Second, in the employment of pressure tables and sleepers in
" which apertures are made for placing the rails fixed and held
" in position by a key or wedge."

" Third, in joining the ends of the rails by splints or side pieces
" placed on each side of the joint, and secured by bolts or rivets
" passed through them and the rails."

" And, fourth, in a frame or apparatus for effecting the change
" or crossing of from one line or set of rails to another."

[Printed, 6*d*. Drawing.]

A.D. 1855, July 7.—N° 1525.

PYM, John.—(*Provisional protection only.*)—" A new combina-
" tion of materials suitable for building purposes."

The patentee says, " I take the following materials in the pro-
" portion as under:—To five hundredweight of bitumen I add
" about five hundredweight of carbonate of lime in powder, about
" one pound of sal-ammoniac, and as much coarse sand or grit as
" will mix freely with the former materials when heated in a
" cauldron; to which I add, as the article may be required to be
" more or less solid or tenacious, resin, shellac, glue, or pitch, the
" proportions of which may vary according to the purposes to
" which the article is to be applied."

"To add strength to the combination when used in the manu-
" facture of railway sleepers or other articles of like character, I
" mix with it when heated cocoa nut fibre, wood shavings, or
" other fibrous substances. I cast the materials in moulds of the
" form and size required."

[Printed, 4*d*. No Drawings.]

A.D. 1855, July 11.—N° 1546.

JOHNSON, John Henry.—(*A communication from Pierre Joseph Bertrand Geoffrey.*)—(*Provisional protection only.*)—" Im-
" provements in the permanent way of railways, and in carriages
" to be used in connection therewith, or on common roads."

The permanent way consists of "an improved construction or
" form of rails and sleepers, and of an improved mode of securing
" or uniting the rails to the sleepers, whereby the junction is
" effected without either chairs, screw bolts, pins, or wedges, thus
" materially reducing the cost of construction. The rails are
" rolled with a considerably rounded surface on their working
" sides, whilst their lower faces or bearing surfaces are rolled per-
" fectly flat, with a projecting dovetailed rib running along their

"entire length. This dovetailed rib is slid into and accurately "fits a corresponding groove in the longitudinal sleepers, the "rails being thus securely held therein without any other fastening "whatever. The transverse section of the longitudinal "sleepers approaches a trapezoidal form, the inner sides of such "sleepers being vertical, whilst their outer sides are made to slope "outwards from the upper edge downwards. These sleepers are "fitted into suitable recesses formed in transverse sleepers, which "serve as the main foundation or support of the way, and they "are secured therein by wedges or key-pieces."

[Printed, 4*d.* No Drawings.]

A.D. 1855, July 24.—N° 1673.

WESTWOOD, JOSEPH, and BAILLIE, ROBERT.—"Improvements "in preserving timber-built ships, also timber or wood "and wrought-iron used in situations exposed to the action of "water or of weather."

"The invention "has reference to the preservation of timber "ships wood, piles planking, or other timber or wood used in "the construction of piers, docks, wharfs, or foundations; also "for railway sleepers, telegraph poles, tensing posts, and other "similar purposes."

"It consists in applying to the wood or iron used for such "purposes a preparatory coating of black varnish, or other composition "having similar properties thereto, and afterwards a "coating of asphalte or bituminous composition, whereby the "latter will be made to adhere with increased tenacity to the "surface to which it is applied."

The varnish composition is first put on with a paint brush, and afterwards the melted asphalte or bitumen is poured on the surface of the wood or metal; or the wood or metal is immersed in the melted asphalte or bitumen; or a brush may be used.

[Printed, 4*d.* No Drawings.]

A.D. 1855, August 15.—N° 1850.

NEWTON, ALFRED VINCENT.—(*A communication.*)—"Improved "machinery for manufacturing railroad chairs."

"This invention consists in arranging and combining with a "suitable frame a cam shaft, which through a rocking lever "depresses a die that holds fast the metal which is to form a rail- "road chair while being cut by a pair of roller shears, such shears being forced upwards by a second lever operated by the same cam shaft. Also in combination with the said roller shears two adjustable benders, secured at opposite sides of the machine and operated by cams on the ends of the cam shaft, for the purpose of bending over the lips of the chair as they are cut and raised by the action of the roller shears, so as to give them the form of the die from which, when the chair is shaped, it is discharged by the action of a forked rod or plunger."

[Printed, *10d.* Drawing.]

A.D. 1855, September 8.—Nº 2034.

BOUCHERIE, Henri.—(*Provisional protection only.*)—"Certain improvements in machinery for impregnating woods with chemical materials for their preservation and coloration."

The patentee constructs "an air-tight vessel or chamber of cylindrical, rectangular, or other form in which the logs or pieces of wood are placed in a vertical position. On the top of each log or piece is placed a plate of metal or other suitable material, with a ring or band of caoutchouc or other flexible substance to connect it with the wood. . . . There is a short tube in the centre of each plate, and these tubes are connected by flexible tubes to other short tubes passing through the sides of the chamber."

The vessel is filled with the preservative solution, which is intended to pass up the grain of the wood and out by the several tubes, attached to the plates. A vacuum is contrived to assist such passage, or the solution itself may be under pressure. The inventor mentions the use of this apparatus for "preparing railway sleepers."

[Printed, *4d.* No Drawings.]

A.D. 1855, September 11.—Nº 2053.

BULL, Henry. "Railway permanent way materials."

The invention has for its object "to reduce the weight of rails at present in use by at least one half without at all impairing the efficient strength of the line; to do away altogether with the necessity for chairs and fishing plates; greatly to facilitate the ease by which lines may be laid down; and in the case of furnishing materials for lines abroad from this country to reduce the cost of freight per mile nearly one half, and increase in like proportion the means of carrying the materials."

"The rail is to consist of a simple plate of iron, bedded and " bolted into longitudinal wooden sleepers, with cross wooden " sleepers, or rather tie bars morticed, bracketted, and bolted into " and to the longitudinal sleepers."

[Printed, 6*d*. Drawing.]

A.D. 1855, September 19.—N° 2113.

BIDDELL, George Arthur. — "Improvements in railway " crossings."

The patentee says, "these improvements relate to those parts " of the wing rails of crossings which are subjected to the greatest " wear, and consist in manufacturing them of cast iron, so that " the parts subject to wear from the action of the carriage wheels " shall be very hard; this hardness being produced either by " using hard white iron, or by the ordinary method of chilling " cast iron, which is the plan I prefer. If hard white metal be " used in part in the manufacture of these crossings, whether " with or without the method for 'chilling,' it should be used in " the manner I will now describe, viz.:—The surface of the wing " rails upon which the wheels are intended to run should form " the lower portion of the mould, so as to receive the hard white " metal, which must be the first portion poured into the mould, " and immediately afterwards the ordinary metal must be poured " in, so as to form a perfect union of the two kinds of metal."

The improvements consist "also in making the bent portions " of the wing rails and a considerable portion of the point rails " as nearly as practicable one compact and solid mass of iron, so " that their relative positions are unalterable when once manufactured as herein described, and perfectly secure against the " casualties which so frequently happen from the effects of ignorance, carelessness, and neglect."

[Printed, 10*d*. Drawing.]

A.D. 1855, September 27.—N° 2155.

POIGNAND, François Xavier.—(*A communication.*)—"Improvements in the manufacture of wedges and keys."

By this invention, wedges and keys are made entirely by machinery. "Suitable blanks are first sawn of the required " length by a circular saw; they are then fixed in frames upon a " revolving platform, where they are finished by a planing machine. " This planing machine consists of a frame which is fitted with " two sets of plane irons placed in opposite directions. The

" planes are moved to and fro by a connecting rod attached to an " excentric upon the shaft of a fly wheel or to a crank. Various " forms may be given to the plane irons according to the required " shape of the finished wedge."

[Printed, 6d. Drawing.]

A.D. 1855, October 2.—N° 2192.

SANDS, Alexander.—" Improvements in securing rails in " railway chairs."

The invention consists " in securing the rails to the chairs by " means of a wedge, driven vertically between the side of the " chair and a block, fitting between the flanges when a double-" headed rail is used." It is also " applicable to any other " description of rail that can be secured to the chair by wedging."

The improvements refer to methods of securing the vertical wedges in their places.

[Printed, 8d. Drawing.]

A.D. 1855, October 5.—N° 2224.

HALKETT, Peter Alexander.—" Improvements in the appli-" cation of motive power to, and in obtaining locomotion for, the " cultivation of land."

The invention consists " in applying the implements of cultiva-" tion required for the various operations of ploughing, scarify-" ing, sowing, reaping, or other operation of culture, by means of " a travelling carriage, moving on tramways or rails, or on other " manufactured ways, placed in parallel lines across the fields, " whereby the said implements are in their operations always " kept at a regulated height, independent of the small undula-" tions or unevenness of the ground, or of the firmness or softness " of the soil, and whereby they are also kept from varying to the " right or to the left of the line of onward motion." For this purpose permanent ways are laid down, " dividing the fields or " pieces of land in a number of parallel lines, the whole being " placed equidistant from each other. The gauge or width " between these lines " is made " as wide as possible consistent " with the practical application of travelling carriages or platforms, " to run backwards and forwards thereon, in order to diminish " the cost of rails, as also the extent of space occupied by such " permanent *way*. To these travelling platforms" are applied or attached "the implement or implements to operate on the soil, "their operation being regulated, if necessary, by an attendant "or attendants, who travel on the platform."

Portable railways may be used if preferred.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1855, October 12.—N° 2286.

LIVINGSTON, John.—(*Provisional protection only.*)—"Im"provements in certain parts of the permanent way of railways."

The improvements are designed "for the purpose of dispensing "with the use of switches or points as heretofore constructed "and employed on railways." The mode commonly practised "has been to plane them to a taper point, and the object of these "improvements is to obviate the necessity for pointing" such parts, by substituting the following arrangement:—

At the crossing a pair of sliding rails is placed, formed either single or double headed, and each pair is connected securely together at such distances asunder "that the flanges of the wheels "of the carriages may pass clear between them;" "and that "one end of such sliding rails corresponds with the butt ends of "the crossing and main rails of the permanent way, and the other "end of the butt ends of one of the rails of each such pair corre"sponds with the butt ends of the rails of the main line only; "and it is at this particular juncture that the action of the sliding "rails takes place, so as to present one or other of the ends "thereof opposite to those of the main rails, whilst the opposite "ends of the sliding rails are securely connected by fishing or "otherwise to the fixed rails which form the crossing and the "main line. An important feature in these improvements con"sists in rendering the aforesaid sliding rails self-acting, which is "effected by the use and employment of two check rails or bars "securely fixed" to the chairs or sleepers of the permanent way "between the inner pair of the aforesaid sliding rails. The ends "of these check rails or bars are curved inwards, and are so "fixed with respect to the main rails as that the straight part "of such check rails allow the flanges of the wheels of the "carriages to pass between them and the side of one or other "of the sliding rails, according to the position such said rails "occupy with respect to the fixed rails."

[*Printed, 4d.* No Drawings.]

A.D. 1855, October 17.—N° 2319.

BESSEMER, Henry.—"Improvements in the manufacture of "railway bars."

Under the head of these improvements the patentee claims,—

"Firstly, the running (while in a fused or fluid state) decarbonized or partly decarbonized iron into a mould, and thereby "obtaining an ingot or mass of iron suitable for and capable "of being formed into a rail or railway bar by the process of "rolling, and the making from such ingots or masses of malleable "iron a rail or railway bar."

"Secondly, melting puddled or partially decarbonized puddled "iron in crucibles, and then casting the same into ingots, for "the purpose of forming rails or railway bars by the process of "rolling."

"Thirdly, the melting and casting cemented puddled iron into "ingots, for the purpose of forming rails or railway bars by the "process of rolling."

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 19.—N° 2349.

FIELD, William, and JEFFREYS, Edward.—"Improved "means for securing the rails of railways in their chairs or "bearings."

"This invention relates to a novel mode of wedging up or fixing "the rails of railways in their chairs, whereby not only will the "rails be securely attached to the chairs, but the butt ends of "adjoining rails will be held firmly in position, and thus even "unyielding joints will be ensured without the necessity for "'fishing' or splicing the rails together."

Several methods are shown, but all embody the claim of the patentees, viz., "the use of compound or expanding wedges, for "imparting pressure simultaneously in a vertical and lateral "direction."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1855, November 1.—N° 2444.

NORMANDY, Lewis.—(*A communication.*)—"Improvements "in securing the rails in railways."

The invention consists in substituting rolled iron railway chairs *for cast-iron ones.* "The intermediate chairs of the said system

" serve to support the rail, and the joint chairs are long enough " to unite firmly together the joining ends of rails so as to " dispense with the use of splints. Each of the said chairs fits " perfectly the mushroom-shaped base of the rail."

The chair "should be rolled of nearly the required size, and " then put red hot in situ. The required tightening may also " be obtained by means of the screw bolt uniting together both " the jaws of the chair and the rail. Instead of a screw bolt a " rivet may be used. For manufacturing the chairs according to " the above-mentioned plan, bars of iron are rolled in the required " shape between suitable rollers. The bars thus obtained have a " sole and two straight jaws. The said bars are then cut into " pieces of the required length, either by means of a circular saw, " when still hot, or by placing them on a lathe similar to those used " for cutting the rails. When this first operation is finished, the " pieces are put again in the fire, if necessary, and they are shaped " by means of a tilt, or of a steam hammer, or of a press on a " mandril, so as to give the jaws the form, so that they may clasp " accurately the footing of the rail."

Rolls may also be used.

[Printed, 10*d.* Drawings.]

A.D. 1855, November 7.—N° 2508.

POUILLET, Charles Marie.—" Certain improvements in " railways," consisting—

" First, in the employment, in the construction of the permanent " way of railways, of sleepers supported upon and fixed to " what are termed " pressure tables or bearers, and provided with cast " iron or other chairs."

" Second, in a new description of iron railway chair."

" Third, in arrangements for joining the ends of rails by splints " or side plates, secured by bolts, rivets, or clamping, and also for " fixing the rails to the sleepers by clamps, bolts, or screws."

" Fourth, in the employment of pressure tables and sleepers, in " which apertures are formed to receive the rails, whereby chairs " are dispensed with."

" Fifth, in a frame or apparatus for effecting the changing, or " crossing from one line of rail to another."

"And, sixth, in the employment, in the construction of the " permanent way of railways of girders with pressure tables " *or bearers to* support flat-bottomed rails."

[Printed, 1s. 4d. Drawings.]

A.D. 1855, November 13.—N° 2551.

WILSON, Fischer Alexander.—" Improvements in engines, " machinery, and apparatus for exhausting, forcing, and lifting " for propelling on land and water."

The invention comprises :—1st. " A series of cylinders or pipes " which are alternately charged with water and air, or steam, so " as to exhaust a chamber or chambers for the purpose of forming " a vacuum therein."

2nd. " An engine or engines with cylinders and pistons actuated " by the pressure of the atmosphere, the said cylinder having a " constant communication (opened and closed at pleasure) with " the exhausted chamber or chambers before mentioned, through " a continuous pipe."

3rdly. A continuous cylinder or pipe carrying a piston with a " lateral arm," and " having a longitudinal groove covered and " entirely closed by an elastic apron or cover fastened down on " both sides, so as to make the groove at all times air tight," one end of the cylinder communicating with the exhaust, and the other open ; " the piston is forced along thereby, and the motion " from the piston effected by its action upon the elastic apron " without any opening or valve therein."

4thly. A similar " cylinder or pipe with a double piston working therein, the connecting arm of which works through a " longitudinal groove, opened and closed by elastic pipes, or " pipes and a tongue, cover, or cork *passing through* an aperture " in the connecting arm of the said double piston, and moved " out of and into the grove thereby, but without absolutely " opening the pipe as the piston moves ; one end of the pipe is " open to the air, and the other in connection with the vacuum, " as before mentioned."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1855, November 14.—N° 2563.

BARNES, William.—" An improvement in connecting and " supporting the ends of the rails of railways."

" For this purpose the end of each railway bar is formed or cut " with a slit or opening in order to receive a filling and connecting " piece, which is formed in such manner as to enter horizontally " into the slit or opening formed in either of two contiguous " railway bars, and to be slided partly therefrom into the slit

" or opening at the end of the other bar, and by such means " to retain the ends of the two bars to the same level; and in " order to prevent either of the ends so connected from shifting " laterally, the filling and connecting piece is made with projecting flanches, which come on either side of the two railway " bars, and they prevent the ends shifting laterally, or separating " one from the other in either direction. The filling or connecting piece is retained from moving by keys or fastenings. " By these means the ends of the rails will be securely upheld " and retained secure, and yet admit of being readily taken up " and replaced."

[Printed, 8*d*. Drawing.]

A.D. 1855, November 17.—N° 2596.

SHAW, Joseph.—" Improvements in the prevention of accidents " arising from collisions on railways."

The improvement consist "firstly, in rendering available the " steam from the boiler of a locomotive engine, and employing " the same in a separate cylinder for actuating the brakes of the " several carriages composing a railway train."

" Secondly, in the use and employment of metal rods and shafts " arranged and disposed along a line of railway, and actuated by " cranks or levers affixed to such said rods, the use of the said rods " and levers or cranks being to enable an approaching train to " give an alarm by an incline on the engine or the tender, or both, " operating upon the levers or cranks which are in connection " with the aforesaid rods so as to sound a bell or whistle, and " thereby give notice to a train when approaching too near " another train in front thereof, and by these means to render " the operation of signalizing self-acting, and thus prevent accidents arising from collisions on railways."

[Printed, 10*d*. Drawing.]

A.D. 1855, November 21.—N° 2627.

MUNSLOW, William, and WALLWORK, Henry.—" Improvements in railways."

"The invention relates to a method of restoring the proper " position of the rail when that part of the chair upon which it " beds shall have become worn." For this purpose are adapted to the chair pieces which may be removed at pleasure.

"These loose pieces may be of any desired shape; but a par-" ticular method" adopted "is to form them of corresponding section to one or both sides of the rail, as well as to the bottom thereof: the two sides being, therefore, drawn together by bolts, keys, or other ordinary fastenings, will constitute a clip by which the rail may be grasped; or if one side only be provided with the loose piece, the rail may be forced against it by any ordinary means.

[Printed, 6*d*. Drawing.]

A.D. 1855, November 23.—N° 2645.

JOBSON, John.—"Improvements in the manufacture of railway " chairs."

The patentee says "The railway chairs in ordinary use have " two jaws, one and sometimes both of which overhang, so that " the pattern cannot be drawn directly out of the sand in which " the chair is moulded. Various methods are therefore employed " . . . . to overcome this difficulty, and to mould the overhanging " parts. By my invention, I effect the required object by con" structing a sliding piece in the jaw of the pattern, which sliding " piece forms the upper portion of the overhanging part, and is " drawn back in a diagonal direction after the sand has been " rammed round the pattern. A space or cavity is thus left, into " which the lower portion of the overhanging part of the jaw is " turned back, this lower portion being mounted upon a pin or " hinge for that purpose. The sliding piece is made to give the " required motion to the hinged piece, so that by merely drawing " back the sliding piece the whole of the overhanging part of " the jaw is relieved and withdrawn from the sand into such a " position that the sand mould can be lifted at once from off the " pattern. If an overhanging part is required on the other jaw of " the chair, that jaw is constructed in a similar manner."

An arrangement for lifting the pattern is described.

[Printed 3*s*. 6*d*. Drawings.]

A.D. 1855, November 29.—N° 2693.

SYMONS, Thomas.—"Improvements in the permanent ways of " railways, and in the wheels rolling thereon."

"The invention consists in the use of a double line of rails, or " *twin rails, instead of* the single line of rails now used." For this purpose "two **H** rails" are placed "side by side, with sufficient " room between them to receive the flange of the wheels," which is placed "in the middle of the breadth of the wheel, and allow " it to bear upon both sides of the flange, and consequently on " both rails."

This is only considered necessary "with regard to the engine " wheels, as a bearing on a single rail will be sufficient for " ordinary carriages; in these, however," the flange on the outside is made "so that it should bear on the inner rail, the flange " having a bearing on each side to keep it on the track. The " **H** rails are fixed together by short bars at the middle of their " depth, and by bolts through such bars are held down to the " sleepers, chairs being altogether dispensed with; double rails " of any other form may be used in lieu of the **H** rail before " referred to."

"Instead of placing the double or twin rail with the bearing " surfaces at a distance apart, with the driving wheel flange " running between them, the parts of the rails may be placed in " closer proximity, and the flange of that wheel placed on the " inside of both rails, the wheels at the same time having a " sufficient breadth in the sole or tread to cover and bite throughout the breadth of both rails."

Another part of the invention refers to the sleepers, which are made in pieces, instead of one piece, as now laid transversely to the rails.

The patentee takes "five pieces of wood of equal length and " size in cross section, say, about eight inches by four inches," and places two pieces "on edge under each rail, at a distance apart " equal to the thickness of the fifth piece, which is placed between " the inner ends of each pair, and bolted thereto."

Instead "of being placed on edge, the transverse tie piece may " be on its flat, which separates the piece under the rails still " further; on any piece becoming damaged it can be removed " and replaced without the necessity of an entire new sleeper. "This construction of sleeper also presents a good form to hold " in the ballast when well rammed."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1855, November 29.—N° 2694.

IRLAM, William. — "Improvements in crossings for rail-*" ways."*

The nature of this invention "consists, first, in casting the point "and portions of the wing rails with the foundation plate, and "in chilling those parts that are liable to be worn by the action "of the wheels of the carriages passing over the crossing."

"Secondly, in attaching the point to the foundation plate, as "in some other crossings, and in casting flanges with the foun"dation plate, to which flanges steel or iron pieces are attached "to form prolongations of the wing rails."

"Thirdly, in placing steel or iron filling-up pieces on the found"ation plate, so that the flanges of the wheels in passing over the "crossing are supported by the said filling-up pieces."

"Lastly, in an improved arrangement of compound chairs or "plates for supporting the rails and point of crossings."

[Printed, 10*d*. Drawing.]

A.D. 1855, December 20.—N° 2881.

EVANS, EVAN.—"Improvements in combining and fixing rail"way bars."

"This invention consists of using two forms of railway bars, in "order that by their combined use the bars of a railway may "be better fixed and the whole rendered more secure. For this "purpose, what are called trough or bridge rails are employed, "together with other rails, each formed with a web or inter"mediate part between the head and foot, or lower part of each "rail. The hollow of the trough or bridge rails and the webs "and feet or lower parts of the other rails are made to fit each "other, so that by removing the head or upper part of a rail "it may enter the end of the next trough rail and give support "thereto, and these parts may be fixed together by bolts, or nuts, "or otherwise, if desired.

"The trough rails are fixed in like manner to what trough "rails have heretofore been fixed, and the other rails may be also "similarly fixed, or only short lengths of such other rails may be "used between two trough rails.

"The patentee claims the combined use of solid and hollow "rails."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1855, December 21.—N° 2897.

GLOVER, CHARLES.—"Removing snow from a line of rail"ways."

This invention consists of constructing and applying a carriage on flanched wheels, suitable for running on a railway. The carriage is framed strongly together, and the fore part is constructed somewhat similarly to an ordinary plough. There is a horizontal cutting edge of a length somewhat greater than the space between the rails, in order that the snow may be removed not only from the over space between rails, but also on either side of the two rails; there is also an upright cutter in the nature of a coulter, and a mould board. The two cutters divide the snow horizontally and vertically, and the mould board turns over the snow at a distance from the rails.

[Printed, 6*d*. Drawing.]

1856.

A.D. 1856, January 1.—N° 4.

NEWTON, ALFRED VINCENT.—(*A communication from François Garnier.*)—(*Provisional protection only.*)—" A novel system of " propulsion, applicable to land and water."

"The carriage to be propelled, instead of running upon a rail-" way upon vertical wheels in the ordinary manner is mounted " upon six horizontal wheels, the peripheries of which run in " grooves made in the outsides of the masonry of the road, which " is raised some distance from the ground. These horizontal " wheels are coupled together, and actuated in such a manner " as always to preserve their parallelism with the body of the car-" riage. The road upon which the carriage runs is provided with " an atmospheric tube, the upper extremity of which terminates " in plates of a double V form, and which are pressed together " by means of pads furnished with counterweighted rods. The " atmospheric valve is opened by means of a series of jointed " arms outside the road or way, connected by means of an " arrangement of levers with the counter-weighted levers above " mentioned; or instead of counter-weighted levers, the atmo-" spheric valve may be kept closed by means of springs, which " will be acted upon from the outside, and open the valve in a " similar manner. When therefore these jointed arms are de-" pressed, by means of a sliding lever acted upon by the driver,

" they will raise the counterweights and allow the valve to open, " the compressed air will then rush into a collapsible air chest " underneath the carriage, and thus tend to lighten its draught, " and the air passing from this chest will act upon inclined " wings mounted at the sides of the carriage, and propel it " forward."

[Printed, 4*d*. No Drawings.]

A.D. 1856, January 15.—N° 108.

HOSTAGE, Joseph, **HOSTAGE**, Thomas Ives Brayne, and **TATLOCK**, John.—" Improvements in railway chairs."

The invention consists in constructing the chair in parts, one of which is designated "the fixed part, having a seat for the rails, " and a check or solid abutment to fit the outside of the same, " which fixed part, in the first instance, is spiked to the sleeper " on one side only to the guage of the railway in the ordinary " manner."

"The other part of the chair," which is designated " the slide " part, is also formed with a check to fit the inside of the rail; it " is furnished with a projecting tongue to fit the space or opening " in the 'fixed part' of the chair, and which projects such a dis" tance beyond the outside of the check in the fixed part as to admit " a wedge or cotter to be driven down vertically through a slot in " the tongue and basement plate of the chair some distance into " the sleeper, the position of the two slot holes being such as to " allow the wedge to draw the whole up tight;" the slide and bottom part are then secured by an ordinary spike driven through both pieces into the sleeper. A thin piece of felt or other suitable material is put between the chair and rails where found necessary, to meet any slight irregularities in the iron work.

[Printed, 8*d*. Drawing.]

A.D. 1856, January 16.—N° 119.

HAMILTON, John, Junior.—" Improvements in constructing " the permanent ways of railways."

" For this purpose corrugated iron is used, bent in an arched " form, in a direction with the corrugations transverse of the " railway. In this manner longitudinal bearings are made, and " the parts are by preference connected together by rivets or " otherwise, so as to form a continuous bearing, and the guage of

" the longitudinal bearers thus formed of corrugated iron is main-
" tained by ties of wrought or cast iron. The longitudinal bearers
" of corrugated iron, it is preferred, should be coated with zinc.
" On the upper parts of the corrugated continuous bearers, trough
" or bridge rails are fixed by screws and nuts, or otherwise. In
" some cases a longitudinal plate of iron is fixed by rivets to the
" upper surface of the longitudinal corrugated bearers, and the
" trough or bridge rails are fixed to such plate, or similar bearers
" may be made and used transversely of a railway."

[Printed, *6d.* Drawing.]

A.D. 1856, January 18.—N° 135.

DE BERGUE, MIGUEL.—" Improvements in the permanent way " of railways."

The invention consists " in so forming the rails with a rib or
" feather disposed vertically, or nearly so, and the support founda-
" tion, or bearing for the rail, with a rib or feather also disposed
" vertically, or nearly so, that the rib or feather of the rail may
" be placed by the side of and against the rib or feather of the
" support, and the two may be bolted or otherwise connected
" together."

It is preferred that the bottom edge of the rail should rest upon the bearing, but the rail may be formed with a shoulder, so as to rest upon the top of the rib of the bearing.

[Printed, *1s.* Drawings.]

A.D. 1856, January 19.—N° 149.

PICKERING, EDWARD.—" Improvements in the permanent way " of railways."

The improvements consist in constructing " a hollow compound
" rail and longitudinal bearer or sleeper of triangular form, and
" having a rail head or surface for travelling upon at each of the
" three angle or edges. This compound rail and bearer is bedded
" in the ballast with one of its angles uppermost, on which the
" wheels of the carriages travel. When one of the edges or rail
" heads is worn out compound sleeper rail is turned, so as to
" bring another of the angles uppermost, and when this is worn
" out it is again turned to bring the other edge uppermost."

[Printed, 1s. 10d. Drawings.]

A.D. 1856, January 22.—Nº 172.

BEECH, John, and JEFFREYS, Edward.—(*Provisional protection only.*)—" Improvements in the means of supporting the " rails of railways."

The invention relates to an improved mode of " constructing " the chairs and sleepers of railways, and consists in constructing " these articles of a cruciform or star shape, so as to obtain a " considerable amount of bearing surface for the sleepers, and " which surface is also so arranged that it may be more con- " veniently and effectually packed than other sleepers of large " bearing surface."

The chair and sleeper is formed of one piece and made of cast iron. It is also proposed "to construct the chairs alone of a " cruciform shape, and fasten the same by pins, bolts, or in any " other convenient manner, on to the ordinary sleepers;" and it is proposed sometimes to adapt these " cruciform chairs to " sleepers made of a cruciform shape, on which such chairs may " be secured in any convenient manner."

[Printed, 4*d.* No Drawings.]

A.D. 1856, January 23.—Nº 177.

TOLHAUSEN, Alexandre. — (*A communication from James Richard Hilliard.*)—" An improved lock-joint for the rails of rail- " ways."

"The object is to unite the sections of rail in the construction " of railroads by a compound lap joint, so disposed that while " the joints give perfect freedom of end play for the expansion " and contraction due to the changes of temperature, and admit " of separation for the purpose of repairs without the use of " screw bolts, nuts, wedges, or other equivalent devices, and with " no other fastening than by spikes to the cross ties or other bed, " the sections shall be as effectually kept in line as if each rail " was one continuous bar from end to end." The improvement then consists " in forming the joint of one section with another " by lapping the one against the other in a central, longitudinal " vertical plane of any desired length, and extending only a " portion of the height of the rail from the top to within a third " of the base, more or less, when this is combined with the " lapping of each section on and under the other in planes longi- " tudinally parallel with the axis of the rail, and transversely

" inclined in opposite directions from the outside towards the " central vertical plane of division of the first-named laps."

[Printed, 10*d*. Drawings.]

A.D. 1856, January 31.—N° 269.

HURST, THOMAS.—" Improvements in the connecting of the " rails or 'metals' generally used on railways."

The connection is formed " by a peculiar mode of 'scarfing' " or scarf-jointing " lengths of rails or metals, " so that the rails " or metals shall have bearings against each other, and upon or " against the flange or flanges thereof, and may or may not be " further connected together by two square or other suitably " formed rivets or bolts, to pass through the scarf-jointing."

"This joint may be made by cutting away the flanges to the " extent required by circular saw, and re-heating the end of the " rail and placing it in a die to press it into form; or the steam " hammer or rolls may be adopted for this purpose."

The patentee claims the scarf-joint, provided with " a tongue " or tongue-piece, either taking its bearing against one flange, " or fitting and locking between both flanges of the rail or " 'metal.'"

[Printed, 6*d*. Drawing.]

A.D. 1856, February 1.—N° 276.

MOATE, CHARLES ROBERT.—" An improvement in securing " and sustaining the rails of railways."

It consists " in holding the rails by a chair rolled in two pieces, " of such a form as that each half of the chair may support upon " a solid bearing the lower flange or bottom of the rail, and " receive or clip the same on either side, and the jaws of the two " portions of the chair being firmly bolted through the middle " portion of the rail, the whole is combined together, effectually " fishing the joint at the lower as well as at the upper flange or " head, as well as supporting that head to resist the lateral strains " or shocks from the railway engines or carriage wheels."

[Printed, 10*d*. Drawing.]

A.D. 1856, February 2.—N° 292.

BURLEIGH, BENJAMIN.—" Improvements in certain parts of " the permanent way of railways."

The improvements are as follows:—

A hollow key of wrought iron, tapered or parallel from end to end, of a section to suit the peculiar form of rail used. "The " said key to be made either as an entire tube or with a slit or " opening in the direction of its length, so as to be slightly com- " pressible when driven in between the rail and the chair."

Constructing "either a solid or a hollow cast-iron key or " wedge to be inserted between the rail and the chair, and so " fitting . . . . as to form, in conjunction with the chair, an " improved rail-holder in two parts, without the aid of wooden " or other elastic packings," &c.

Constructing "a pair of wedges to be used with a chair of " improved form, and when inserted between the rail and the " chair, the wedges are made to move from each other in opposite " directions, either by means of a right and left hand screw or " a vertical wedge inserted between their larger ends for the pur- " pose of forcing them apart and thus fixing the rail."

"Constructing a chair of cast or malleable iron, having a " groove or space in that part below the under side of the rail, " for the purpose of preventing the indentation or notching of " the centre portion of the lower table of the rail."

Improvements in the inventor's previous patents, No. 2719, 1853, and No. 45 of 1854, viz.:—

"In constructing those parts of the crossings called the 'point " 'rail' and 'flange bearers' in one solid piece, either of cast or " malleable iron, or the same may be made in one casting with a " hollow centre, and in either case be similarly shaped both on " the top and bottom surface;" and constructing "the crossing " point and flange bearers in parts, such parts being divided " longitudinally by inserting between them bars of steel or " wrought iron, or a combination of both; and so placed as to " bear certain portions of the wheels or their flanges when " passing over the crossings."

Constructing "cast-iron crossing chairs so formed that the " jaws clip or embrace certain portions of the outer sides or " flanges of the wing rails, and hold them firmly without the aid " of wooden keys or wedges, ... and also crossings with the " check or guard rails so raised or elevated above the surface of " the main rails as to insure an additional amount of safety to " passing trains."

Forming "the tongue rail of a switch" by extending "the
" projecting portion which bears the flange of a wheel to a point
" beyond the hinge joint, so that it laps over the adjoining rail,
" and being bolted thereto forms a break joint, and at the same
" time improves the hinge of the switch."

Constructing "the hinge of a switch with a chair either of
" wrought or cast iron, having a jaw on one side only, against
" which the tongued rail lies."

[Printed, 10*d.* Drawing.]

A.D. 1856, February 8.—N° 338.

JOWETT, Henry Alfred.—(*Provisional protection only.*)—
" Improvements in rails used for the construction of the permanent way of railways, and in the means of laying down and
" fixing them in conjunction with the present rails in use."

The invention consists "in a novel and improved formation of
" wrought iron or other metal rail," which is "termed the
" 'trigone' or rail of three surfaces; for example, instead of the
" ordinary double or ⊢⊣ rail, ... it is proposed to roll or
" otherwise form a rail with three wearing surfaces for the wheels
" to travel upon. Two of these surfaces" are "to be partially
" embedded in the wooden sleepers, placed as they now are in a
" transverse position, and spiked or bolted through the angle
" arms into the said sleepers."

Another construction of rail with four wearing surfaces is to be formed of a somewhat similar shape to the other rail; . . . . but "the wearing surfaces of this rail are on the side where the
" flanches of the wheels of the carriages now run or press against
" the side rail, and instead of the rail being placed on end," it is proposed "to lay it on the side, two of the wearing surfaces being imbedded in the sleeper, and a bolt or spike passed
" through the centre arm or tie bar of the rail into the sleeper."

[Printed, 4*d.* No Drawings.]

A.D. 1856, February 14.—N° 388.

COWPER, Charles.—(*A communication from Henri Boucherie.*)
—" Certain improvements in impregnating wood with preservative and colouring materials, and in apparatus for that
" purpose."

The patentee constructs "an air-tight vessel or chamber of " cylindrical, rectangular, or other form in which the logs or " pieces of wood are placed in a vertical position. On the top " of each log or piece is placed a plate of metal or other suitable " material, with a ring or band of caoutchouc or other flexible " substance to connect it with the wood. . . . . There is a short " tube in the centre of each plate, and these tubes are connected " by flexible tubes to other short tubes passing through the sides " of the chamber."

The vessel is filled with the preservative solution, which is intended to pass up the grain of the wood and out of the several tubes, attached to the plates. A vacuum is contrived to assist such passage, or the solution itself may be under pressure.

The inventor mentions the use of his apparatus for "preparing " railway sleepers."

[Printed, 8*d*. Drawing.]

A.D. 1856, February 19.—N° 415.

BOWERS, William Henry.—"Improvements in the construc" tion of railways," namely,—

First, "a sleeper or bearing of plate iron curved into a segment " of a circle, and secured from spreading out by a flat tie plate " turned up at each side, into which the curved plate is placed, " and on the top of which is fastened the rail, either by rivets, " bolts, or chairs."

Second, "a sleeper or bearing of flat plate iron, under which " is fastened T or angle iron, to give vertical strength."

Third, "a sleeper or bearing of a rectangular or circular plate " having one or more ribs on its under side to give vertical strength."

Fourth, "a sleeper or bearing of a circular plate, corrugated to " give vertical strength, the corrugations being circular with the " plate or radiating from its centre."

Fifth, "to support the rails in corrugated bearings," a portion of the plate is punched out crossways with the corrugations and the rail is inserted in the openings, and is thus supported without the use of the ordinary fastenings.

Sixth, constructing "a rail to carry its own bearings or sleepers, " the section of which is similar to a common girder, the top " flange forming the rail, and the bottom flange having sufficient " breadth or *bearing* to form the sleeper."

Seventh, forming a "clip or fish-joint for securing the ends of "rails; it is made in one piece of metal, and consists of two side "plates connected by a cross piece, which obviates the necessity "for bolts and the danger attending their getting loose."

[Printed, 10*d*. Drawing.]

A.D. 1856, February 20.—N° 430.

BROOMAN, Richard Archibald.—(*A communication from A. Dumas.*)—(*Provisional protection only.*)—"Improvements in "working railway switches and crossings, and certain indicating "apparatus for preventing accidents on railways," consisting,—

"Firstly, in working railway switches and crossings from the "locomotive, instead of from the road."

A roller attached to the front of the locomotive works the switch, which is restored to its normal position by a spring.

"And, secondly, in a tell-tale or clock-work index for indicating "the passage of every train and the time elapsed since its passage, "which consists of an apparatus fitted with a dial and pointer, "worked by clock work and the passage of a train." This apparatus exhibits to the driver of a train how long a time has elapsed since the passage of the previous train. "A disc marked with "figures is worked also by the passage of the train, and exhibits "in front of the apparatus the number of trains which have "passed."

[Printed, 4*d*. No Drawings.]

A.D. 1856, February 25.—N° 474.

NORMANDY, Louis.—(*A communication from Louis D'Aubréville.*)—"Improvements in the mode of constructing and fixing "the rails of railways."

The invention consists "in substituting longitudinal rolled iron "sleepers to the wooden cross or longitudinal ones now in use "for laying the rails in the construction of the permanent way "of railways, such sleepers being united from place to place by "cross sleepers or transoms, made also of suitably I-shaped "rolled iron, the whole forming a compact body resting directly "on the ballast."

The patentee says, "The advantage consists in the facility of "replacing worn out rails without replacing the sleepers, and "*because it is* thus possible to use for the rails rough steel or iron

" of a harder kind than is commonly employed, and, in the new " lines to be established, the rails are much lighter than those in " ordinary use."

The rails may be secured in various ways, according to the pattern.

[Printed, 8*d*. Drawings.]

A.D. 1856, February 27.—N° 503.

ALLEN, Edward Ellis.—" Improvements in the permanent " ways of railways."

The rails are so formed as to be " supported and sustained by " longitudinal projecting plates or wings, one on each side of " the rail," such projecting wing or plate on one side is near the upper part or head of the rail, and the one on the other side is near the lower part.

" Convenient forms of rails are produced for carrying out the " invention, by making two angle irons, with an enlargement at " the angle of each to form the heads of a rail when two such " are reversed in their positions and are bolted and combined " together."

[Printed, 8*d*. Drawing.]

A.D. 1856, March 4.—N° 547.

CODDÉ, Louis.—(*Provisional protection only.*)—" A system of " submarine communication."

" In a mode of constructing submarine railways " iron tubes are employed " which, when united together, form a single continuous " tube, in which the railway is to pass. The tubes are provided " internally at proper intervals with joints. To prevent water " from entering the tubes when being sunk and previous to their " junction, the extremities " are closed " with an iron plate " screwed or bolted to the joints, with which one of the extremities " of each of the tubes is provided."

One plate is concave and the other convex. " By this arrange- " ment, when the tubes are united together, the plates fit into " each other completely, and the tubes being screwed or bolted to " the joint, the interior of the tubes becomes hermetically closed. " When all the tubes are united together " the plates are removed and the rails laid down. " The external surface of the tubes is " *coated with hydraulic* cement, and, as a further precaution,

" previous to applying the cement, gutta percha, or other analo-" gous substance, may be laid over the points of junction of the " pipes. When the depth of the sea renders it impracticable to " place the railway on the bottom, the tubes may be supported in " sections on floats, placed at the necessary parts, and the usual " means of suspension are employed."

[Printed, 6*d*. Drawing.]

A.D. 1856, March 5.—N° 556.

BILLINTON, William.—" An improved method of treating " wooden railway sleepers."

" Applying by suitable machinery longitudinal or end pressure " to wooden railway sleepers after they have been cut into shape " and before they are laid down for use. The length of time " necessary for continuing the pressure will depend on the state " of the wood, if green the pressure must be continued longer " than if the wood is dry. The beneficial effect will be, that " without " saturating with liquids " the wood will be rendered " non-absorbent of wet and therefore not liable to decay and " disease."

[Printed, 4*d*. No Drawings.]

A.D. 1856, March 7.—N° 570.

DOWNIE, John.—" Improvements in moulding or shaping " metals or other materials."

" The invention relates to a system or mode of moulding metals " or other materials, wherein the pattern has motion given to it " during moulding so as to effect the finishing of the moulded " surface by mechanical means, leaving nothing to be done by " hand on the withdrawal of the pattern from the moulds. This " system is applicable in moulding a wide range of articles."

An apparatus for moulding chairs is described.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1856, March 7.—N° 572.

BROWN, David, and BROWN, William.—" An improve-" ment or improvements in rolling railway switches from rail-" way bars, and in rolling taper ends on other bars requiring the " same."

The patentees say, we heat such portion of the bar as it is wished to taper, leaving the other part cold; we place the said heated end between excentric rolls . . . . when at their greatest distance apart, through an opening made by cutting away a portion of one or both of the rolls. "The clutch box or gearing mechanism is now made to gear the rolls with the driving power, when the said rolls grasp the heated iron and taper it between their gradually approaching surface." The bar having left the rolls they are thrown out of gear, and brought to rest in such a position "that the portion cut away from one or both rolls is opposed to the other roll, in which position the said rolls permit the bar to be again introduced between them. This is repeated until the required taper is obtained. When bars require tapering at both ends, both ends are subjected to the action of the rolls, and we sometimes taper a rail at both ends, and cut it in two pieces so as to make two switches therefrom. A stop is situated in front of the rolls to determine the distance to which the bar is introduced between them, this stop is capable of adjustment. The rolls rotate in such a direction that the bar is delivered back by the said rolls to the workman on that side on which it is introduced. Instead of both rolls being excentric, one only may be so."

[Printed, 8*d*. Drawing.]

A.D. 1856, March 12.—N° 594.

SPENCER, George.—"Improvements in supporting the rails of railways."

Wrought or cast iron corrugated plates are used running under or along both sides of the rail, on these plates are placed "at intervals short bearers or girders of wrought iron, or short transverse bearers of corrugated iron, which are to be attached to the top of such side or bottom bearing plates, and to these the rails are secured." Various modifications of this system are shown.

[Printed, 10*d*. Drawings.]

A.D. 1856, March 14.—N° 620.

CLAY, William. (*Provisional protection only.*)—"Improvements in the manufacture of the points or switches and crossings of railways."

The present invention relates to the means of producing *tapering bars or points with* less labour than is usually required, and this may be done in two ways, either by rolling down iron to a taper form and by means of machinery, or by taking iron bars of a parallel or nearly parallel form, and by means of circular saws, or other suitable or convenient contrivances, and cutting off one of the angles of the bars, so as to bring it into the required form for a point or crossing.

[Printed, 4*d*. No Drawings.]

A.D. 1856, March 18.—N° 643.

ROWLEY, Edward, and HADLEY, John. — "A new or " improved method of shaping iron."

A method of giving a taper form to bar iron, whether the said bar iron be plain or angle iron, or **T** iron, or iron otherwise shaped.

The tapering is effected by means of pressure in a die of the exact taper which is to be communicated to the iron. The iron is placed suitably heated in the die and passed under a roll. The pressure of the roll forces the heated iron into the die. "When " the iron is to be made taper from one end to the other, pres- " sure is first applied to the wide end, and from thence to the " narrow end. When the tapering proceeds from the middle to- " wards each end, the pressure is first applied at the middle, and " from thence to one end;" then again at the middle, and from thence to the other end. Iron shaped thus is applicable for ships' knees, girders for roofs, switch rails for railways, and other purposes where great strength is required.

[Printed, 6*d*. Drawing.]

A.D. 1856, March 19.—N° 653.

LACY, Augustus Dacre.—"Improvements in certain appa- " ratus for taking-up and delivering mail bags and other pack- " ages from a railway carriage or carriages whilst the train is in " motion."

The apparatus consists of a bracket or support extending from a post fixed at the side of the line, carrying a bar, which extends in a direction parallel with the line of rails. "At the end of this " bar is fixed a pair of springs, of such form as to be capable of " receiving the ring of the bag or package as it is delivered from " the moving carriage, and gradually to offer resistance to its " motion until it is passed into a retaining hook and there held.

" Such retaining hook being connected with a spring, so as to " lessen the concussion occasioned by the ring passing into the " hook. The apparatus on the carriage or carriages " is similar; " also on the box containing the kind of buffer spring in con- " nection with the hook, there is a socket capable of receiving " a kind of neck attached to the bag or package, and there " holding the latter after it has been delivered from the moving " carriage, or in readiness to be taken up thereby, as the case " may be."

[Printed, 10*d*. Drawing.]

A.D. 1856, March 24.—N° 690.

HEATON, THOMAS.—" Improvements in self-acting doors and " gateways," applicable, amongst other things, to "gates leading " to private railways of collieries," mines, &c.

By one method, " a line or cross shaft " is placed " below the " road where the gate or door is required. On the said shaft are " two eccentrics or slotted cams, acted upon by rods connected to " the rails or levers. On the shaft two bevil wheels are fixed, " working into two other bevil wheels on the lower part of the " gate backs. The said wheels are put in motion, and the doors " or gates opened by the pressure of the weight acting on the " levers, rails, or platforms, which are attached to the permanent " rails at any convenient distance from the gates or doors, and " rising towards them from about three to five inches above the " level of the road or passage." Springs are added to close the gates after the weight is relieved. " The same result " is obtained " by connecting the rails, levers, or platforms to levers " made on the principle of a steelyard," " thus causing the doors " or gates either to rise up, fall down, open sideways or parallel " to the levers or platforms; the counter or return movement " being caused as before either by weights or springs."

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1856, March 29.—N° 752.

SANDS, ALEXANDER.—(*Provisional protection only.*)—" Im- " provements in securing rails in railway chairs, and in the con- " struction of railway chairs," consisting—

" In the application of steady pins fixed into or projecting " *from railway chairs*, and taking into holes or slots in the rails,

" for the purpose of preventing the longitudinal and upward
" motion of the rails. These steady pins may be cast on the
" chairs or introduced into holes cast in the chairs, or made of
" wrought iron and laid in the mould, so as to be secured by the
" metal of the chair."

Also " in the construction of such railway chairs as are put
" together in two parts; one part of the chair is furnished with a
" T-headed, or other suitably shaped projection on which the
" other part fits, the two parts being connected together by a
" vertical key, the action of which causes the two parts of the
" chair to bind against and secure the rail; the holes or slots for
" the keys and steady pins, and the sides of the loose jaw are
" cored out in casting on chills or mandrils."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 4.—N° 818.

RAMIÉ, Charles William.—" Improvements in constructing
" the permanent way of railways."

" For this purpose ordinary double-headed rails are used," and to support them and retain them in position, on either side of the rails are fixed wings or plates which form longitudinal bearers to the rails and are fixed either continuously or at intervals. The plates or wings are made in the form of angle iron, so that the edge will, " where it is in contact with the web or side of the
" rail, lie close thereto and admit of bolts being passed through the
" rail and through that portion of the wing or plate in contact
" therewith, and the plate then comes in contact with the lower
" head of the rail, and rests thereon; the plate or wing is then
" found to incline upwards from the lower part of the rail to the
" outer edge of the plate or wing in order to facilitate packing.
" On the under sides of these wings or projecting plates are fixed,
" either at intervals or continuously, bent plates or angle irons;
" the flanges of these come under the rail, and by being fixed by
" rivets or otherwise to the wings or projecting plates, are then
" by screw or cotter bolts capable of being drawn towards each
" other, and not only to form under supports for the rail, but at
" the same time cause those parts of the wings or projecting
" plates to clip and hold securely on the lower head of the rails."
Many methods of applying this system are indicated.

[Printed, 10d. Drawing.]

A.D. 1856, April 5.—Nº 821.

JONES, JAMES.—(*Provisional protection only.*)—" Improve-
" ments in railway chairs, and in the method of securing the rails
" to the same."

"The said invention is chiefly applicable to joint chairs, but
" may be adapted with advantage to single chairs as well." The
" bed of the chair" is raised "a little in the centre, so that the
" centre of the rail only bears upon the said raised part thus
" forming a partial bedding instead of a solid one, as is now
" generally adopted. By this partial bedding, when the rail is
" turned upside down there will be no shoulder left on it, as in
" the present case. In jointed chairs two screw bolts" are passed
" through the side of the chair and the rails, so that one bolt
" passes through near to the end of one rail, and the other bolt
" passes through near to the end of the other rail, thus keeping
" the joint perfectly tight, and preventing the ends of the rails
" rising or lifting from the chair. For the purpose of tightening
" or wedging the rails in the chair, a wedge or fish" is introduced
" when necessary, or a shoulder" is formed "on one side of the
" chair so that it can be screwed up with the rails and form a
" perfectly tight joint."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 8.—Nº 853.

RANSOME, JAMES ALLEN, and BIDDELL, GEORGE ARTHUR.
—(*Provisional protection only.*)—" Improvements in the manu-
" facture of railway bars and flanch bearers of railway crossings."

" For these purposes railway bars of the sections desired are
" to be cast, which is not new; but in place of simply casting
" railway bars of uniform quality or hardness, as heretofore,
" the process of casting is so conducted that the surfaces on
" which the wheels are to run are to be cast harder than the
" other parts of the railway bars, and is done either by chill-
" casting the wearing surfaces, or else by using different quali-
" ties of cast iron and running the harder quality into the
" moulds to come to the wearing surfaces of the bars. In
" making flanch bearers of the crossings of railways, their
" wearing or upper surfaces are chill cast, or else they are formed
" by running the harder metal into the moulds to come to the

" wearing surfaces of the bearers, and the softer or tougher " metal is run into the moulds to form the other parts of the " bearers."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 9.—N° 860.

MORRELL, George Frederick.—" Improvements in the " manufacture of railways chairs."

The invention consists in " cutting sheet iron into suitable " shapes and in bending up the sides to form the jaws of the " chairs."

[Printed, 1*s*. Drawing.]

A.D. 1856, April 14.—N° 884.

RICHARDSON, Robert.—"Improvements in railway switches."

The patentee says, " I construct the tongue rail of the switch " of a double-headed or other form of rail, the end of which " is bent downwards and also bent towards the main rail, so " that the upper part of the tongue rail passes partly under " the upper table or flange of the main rail. One side of the " upper part of the tongue rail may be sloped off or removed " by planing or otherwise. When double-headed rails are employed, both flanges of the tongue rail may pass under the " corresponding flanges of the main rail. By this construction a " strong tongue rail is obtained."

[Printed, 10*d*. Drawing.]

A.D. 1856, April 18.—N° 926.

STANSBURY, Charles Frederick.—(*A communication.*)—(*Provisional protection only.*)—" An improved mode of splicing " and fastening the adjacent ends of the rails of a railway track."

It consists in securing the joints of the rails of the permanent way " by the employment of splice pieces or beams of wood " securely attached on one or both sides of the rails, such " wooden splice pieces being long enough to extend lengthwise " along the rail so as to cover three or more sills, and wide enough " to have a firm bearing upon them and to be securely fastened " thereto, the height of the outer splice piece being limited only " by the height of the rail, it being only necessary that the tread " of the passing wheels shall not come in contact with its upper

" surface, and the height of the inside piece being determined by " the height of the rail, and the sizes of the flanges of the wheels, " both said splice pieces being of sufficient strength to bear the " heaviest loads without sensible vertical or lateral deflection."

[Printed, 4d. No Drawings.]

A.D. 1856, April 23.—Nº 975.

PERRING, John Shaw.—"Improvements in chairs for railways."

"The application to railway chairs of a wedge or key acting by " its own gravity." One side or cheek of the chair is constructed " so as to fit the rail in the usual manner, the other side thereof " acts as a stop at bottom, and is then carried upward at an angle " of not less than seventy degrees with the horizon. Within the " space formed by this angle " is applied a " loose piece of metal, " one side of which rests upon an inclined plane, and acting " thereon by its own gravity presses by the other side against the " face of the rail, so as to keep it in contact with the opposite " cheek of the chair. In the case of a joint chair " it is cast " of " sufficient length and of suitable form to use two or more pieces " of loose metal, acting as above described."

[Printed, 6d. Drawing.]

A.D. 1856, April 23.—Nº 979.

BROWN, David.—(*Provisional protection only.*)—" A new or " improved method of joining the rails of railways."

The ends of the rails to be joined are rolled of such a figure that when they are placed together "they shall form a rail of " nearly the ordinary section; that is to say, the two ends of the " rails are of a figure nearly resembling that which would be produced by slitting a rail in a vertical plane, and in the direction " of its length. A rebate or recess" is made "in the inside " vertical face of the end of one of the rails," and a projection on the other fitting in the said rebate or recess. That part of the rail situated between the upper and lower heads of the rail is made of somewhat greater thickness as far as the joint extends.

[Printed, 4d. No Drawings.]

A.D. 1856, April 22.—Nº 1015.

GREENSHIELDS, Thomas.—" Improvements in sleepers for " *railways.*"

The invention consists "in constructing a transverse wooden " sleeper, ... and in order to obtain the greatest amount of " advantage from the elastic quality of the wood, the bottom of " the rail, instead of having about three inches bearing in a cast-" iron chair, has a direct bearing of eighteen inches on wooden " blocks, the blocks being made eighteen inches long, twelve " inches wide, and seven inches thick. . . . . The rail is secured " in position by a chair made of wrought iron, ... the centre " part of the chair being sunk to give the rail a direct bearing on " the wood. . . . . The wrought-iron chair being sunk in the " centre and let into the sleeper, gives greater security, more " particularly in passing round curves, as the chair by this means " is not dependent on the pins only to keep it from shifting."

The wood blocks, &c. are first saturated with a solution of alum and common salt, after which they are dried and painted over with a mixture of tallow, tar, and rosin.

[Printed, 6*d.* Drawing.]

A.D. 1856, May 2.—N° 1041.

WAITE, William.—(*Provisional protection only.*)—" An im-" provement in the construction of sleepers and rails for rail-" ways."

" First, a groved or rabbitted, or groved and rabitted, or both, " or either bevelled longitudinal sleeper, wholly or partly made of " wood or other suitable material, and constructed of one or more " pieces."

" Second, a rectangular iron or other rail, either solid or tubular, " adapted to the above-described sleeper, and fixed thereto by " bolts, screws, or other fastenings."

" Third, a peculiarly constructed rail, of iron or other suitable " material, and being two sides of a square, in form capable of " being reversed or fixed with either of its two outer sides upper-" most, having bevelled or other edges, and otherwise adapted for " fixing by bolts, screws, or other fastenings, to the above described " longitudinal sleeper."

" Fourth, a square, triangular, or other form of rail, constructed " of iron or other suitable material, to be adapted to such above " described longitudinal sleeper, and fixed by bolts, screws, or " other fastenings."

[Printed, 4d. No Drawings.]

A.D. 1856, May 6.—N° 1064.

CURTIS, William Joseph.—(*Provisional protection only.*)—" Improvements in constructing the permanent way of railways."

" This invention has for its object improvements in constructing " the permanent way of railways. For this purpose the longitudinal bearers are made of bitumen, with or without stones " or other matters, and it is preferred that each such bearer " should be of a triangular form with the apex downwards, and " it is recommended that such bearers should be continuous. In " forming these bearers, other longitudinal bearers of iron are " introduced into, and by the cooling and setting of the bitumen " are fixed in the bitumen. These iron bearers when for trough " rails, it is preferred should be of the form of a cross, and when " the other forms of rails should be of a **T** form; but the form of " for longitudinal bearers of iron may be varied, so long as, by " their being fixed by the cooling and setting of the bitumen, " they will not only be held securely themselves, but will admit of " the trough or other forms of rails being readily fixed thereto by " screw bolts and nuts, or otherwise, in a manner to admit of the " rails being readily removed and replaced, whilst the longitudinal " bearers of iron remain secure in the bearers formed of bitumen, " or bitumen mixed with stones or other hard matters."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 13.—N° 1127.

RAYWOOD, Robert.—(*Provisional protection only.*)—" Improvements in railways."

" The invention relates to the rails used in the permanent way " of railways, and consists in forming the same of two parts, " each having a **T**-shaped head or edge formed upon it, so that " when they are placed together the two will constitute a continuous rail, having a section corresponding to those now in " general use; by this means the necessity of what is usually " known and termed the 'fish joint' will be obviated." One arrangement is as follows:—" Two bars of any convenient length, " and suitable in width, &c., each having as before mentioned a " **T**-shaped head or edge; these bars have also grooves or slots " formed *in such a manner* that when they are placed side by side

" one edge of one will take into the groove of the other, by this " means securing them so as to form the rail, as above mentioned.

[Printed 4*d*. No Drawings.]

A.D. 1856, May 13.—N° 1129.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—"Improved machinery for removing snow from railroad tracks."

It "consists in so constructing the snow plough, that a simple " inclined plane or wedge will act in the first instance to raise " up the snow entirely, and then two vertical surfaces curving " laterally will press off the snow so elevated on to the top of the " surrounding snow, by which means the lateral packing and " jamming of the snow are avoided." The apparatus is warmed by heating pipes for the purpose of diminishing the adhesion of the snow to the upper surface of the clearer.

[Printed, 6*d*. Drawings.]

A.D. 1856, May 15.—N° 1152.

GREAVES, HUGH.—" Improvements in the permanent way of " railways."

" Sleepers are employed, to which the rails, whether flat-bottomed or foot rails, are rivetted or otherwise secured. These " sleepers are made of cast iron, and in some cases round, oval, " or in the form of a ring; the concave side in all cases " is placed " towards the ballast. In some cases the rails and sleepers " forming one line of roadway are connected together by tie " bars, to preserve the guage and angle of the rail." A rib is cast "on the sleeper at right angles to the rail or parallel with " it, or a short bar of wrought iron " is inserted "round which " the metal is run in casting. In securing the rails at the joints " instead of using three distinct wooden keys to a three jawed " chair . . . . one long taper wooden key " is used, " or three " vertical wood wedges; on the fish in the inside or outside" is cast "a short stud, which fits into a hole in the rail to " prevent its travelling, and the fish on the other side, if of " wrought iron, has a hole punched and a short pin inserted, " or burr raised, fitting the same hole or the hole in the rail, to " prevent the fish from travelling when the key is driven home; or " two fish plates, two bolts, and one wooden key between them " are used "for securing the joints of rails; or a double jawed

" chair and two fish plates secured by a wooden key. In order
" the more effectually to equalise and economise the iron of the
" tyres of the wheels a rail " is employed " the stalk of which may
" be out of the centre, the inner edge of the working surface of
" the rail only being employed as a guide for the wheel flanges, or
" the usual section of rails may be employed with a flange added,
" rising above the working surface on the outside of such rail,
" to act as a guide as the wheel flanges now do, so as to bring
" into work that part of the tyre which is now turned off and
" wasted. For railways laid in streets or at those places on rail-
" ways where horses are employed paving blocks of iron " are
used " in which the rails rest (where rails are required). These
" blocks are hollow, of a square or hexagonal or other form, flat
" on the surface or nearly so, and packed through a hole in the
" surface of such blocks, and cast with projections on them as
" foot hold for the horses."

These improvements also refer to previous patents granted to the inventor in 1852, but of which patents the numbers are not specified.

[Printed, 1s. Drawing.]

A.D. 1856, May 21.—N° 1207.

HERON, GEORGE.—" Improvements in machinery or apparatus
" for raising, lowering, moving or transporting heavy bodies."

" This invention relates to certain arrangements and combina-
" tions of wheels and pullies, actuated by a piston and piston
" rods, or pistons and piston rods, working in one or more cylin-
" ders, for the purpose of raising, lowering, hauling or moving
" heavy bodies, the required power being derived from steam,
" compressed air, gas, water, or other fluids acting upon either
" side of a piston or pistons in a cylinder or cylinders. The
" object is to obtain a multiplying motion so that a great haul
" or lift may be obtained by a comparatively short stroke of the
" piston. And for the purpose of turning a crane post or jib
" a railway turntable, or such like machinery," the inventor
claims the use of this system and the modification he describes.
" Two or more cylinders with pistons and piston rods may be
" combined, so as to vary the power of the machine, by causing
" the cylinders to act separately or in conjunction with each other,
" according to the degree of power required."

[Printed, 10d. Drawing.]

A.D. 1856, May 26.—Nº 1253.

RYE, WHARTON.—(*Provisional protection only.*)—"Certain "improvements in fixing or fastening rails or railways in their "chairs."

"In one side of an ordinary cast-iron railway chair is inserted "a wrought-iron screwed nut (or nuts), in which works a screw "bolt (or bolts), the head of such bolt being screwed against an "intermediate block or plate for holding the rail, which block "or plate is so constructed as to fit the outside or shape of the "rail, and dispenses with the use of wooden or other wedges. "Between the rail and the bottom, or that part of the chair upon "which the rail usually rests, a space is left so as to keep the "rail suspended between the side of the chair and the fitting "block or other plate. By this means the under side of the rail "is preserved from wear or injury, nor can the surface of such "under side be in any way rendered unavailable for further use, "which is the case when the rail is allowed to rest or bed upon "the bottom of the chair, as in the ordinary method of fixing or "fastening rails; or, if preferred the rail may rest or bed in the "chair in the ordinary way."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 27.—Nº 1265.

TALBOTT, EBENEZER.—(*Provisional protection only.*)—"Improvements in the construction of rails for railways."

This invention consists "in a peculiar construction of split or "compound rails . . . . with perfect bearings or flanges, and "which when combined have the required strength and structure "of ordinary railway rails."

"In a transverse section of double webbed or double headed "rails made according to the improvements, the rail is cut "through its centre, vertically, without the cut passing through "either the longitudinal or the lateral bearings of the rail, but "diverging at a right angle or thereabouts, and passing out "on the left hand side underneath the top web or flange, and "in like manner on the right hand side above the lower web or "flange, or vice versa." In this manner "compound rails are "somewhat similar to two bars of **T** iron, placed side by side in "*reversed position*, and may be bolted at suitable intervals along

" their sides for security, and they may be connected with fish " joints or otherwise, as usual."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 27.—N° 1269.

DIMPFEL, Frederick Peter.—" Improvements in construct- " ing the permanent way of railroads."

" This invention relates to a novel mode of connecting the " rails of railways to the wooden sleepers. . . . . In place of " securing the rail by means of pins or spikes to the upper " surface of a longitudinal sleeper, the foot of the rail " is embedded " in the sleeper by cutting out suitable grooves therein " to receive the rail. . . . . and in order to do so the rail is cut " longitudinally down the middle, and by means of a suitably " shaped cutting tool grooves or recesses " are cut " in the inner " side of the two halves of the longitudinal sleeper of such a size " and shape to receive the foot of the rail when the two halves " of the sleeper are brought together again. By this means the " greater portion of the rail is enclosed between the sleepers, and " the foot thereof rests half on one half of the sleeper and half " on the other half."

" In order to prevent as much as possible the lateral deflection " of the rails, it may be desirable to give one half of the sleeper " a greater elevation than the other half, the lower half being at " the hightest elevation compatible with the flange of the travers- " ing railway wheels clearing it, but the other abutting against " the head of the rail. A resisting medium is thus provided " against the lateral pressure of the passing train."

[Printed, 6*d*. Drawing.]

A.D. 1856, May 31.—No. 1294.

SPINK, Daniel.—(*Provisional protection only.*)—" Improve- " ments in rails and railways."

" First, in a new form of rail for railways, which may be of the " usual section, transversely, employed on narrow guage lines, " with the difference of having flanges formed on each side, and " rolled out of the rail itself; these flanges or supports are " placed at right angles to the neck of the rail, and equidistant " from the upper and lower faces thereof; and, second, in laying " the rails, which are to be sunk into the ground or ballast, half " way as far as the said side flanges, and either angle iron or bar

" iron may be used as braces, to keep the line to its proper width " or guage. Timbers and chairs may thus be dispensed with, " and when one face or bearing of the rails is worn, they may be " reversed."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 6.—N° 1346.

ROBINSON, Joseph.—(*Provisional protection only.*)—" Im-" provements in railway chairs, or in means for securing rails " thereto."

" They consist in employing for securing rails to their chairs an " axis having an excentric formed on it, which occupies the " position of the wood key commonly used for this purpose. The " axis of the excentric rests in bearings formed in a loose block, " or in bearings formed in the chair, so that when turned its " excentric comes in contact and acts upon a loose block or blocks " placed against the side of the rail, or against the chair, or a " loose block placed against the jaw of the chair, in such manner " as to force the loose block in which the bearings of its axis " rest, or the block or blocks in contact with it, tightly and firmly " against the side of the rail. The axis of the excentric is pre-" vented from turning back when tightened by means of a pawl " jointed to the chair or to the block in which the bearings of the " excentric rest, which pawl takes into ratchet teeth in a segment " formed on or fixed to the end of the axis, which may be turned " by a wrench by having a suitable provision made, or by other " means."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 9.—N° 1368.

JOHNSON, John Henry.—(*A communication.*)—" Improve-" ments in the construction of rails for railways, and in the mode " of securing the ends of rails for railways."

" The rails, which may be of the flat-bottomed or girder form, " or of the ordinary H or T shape, or other convenient pattern, " are rolled with slide lugs or flanges at each end and at suitable " intervals along the rail, and these flanges at the ends of the " rails rest on and fit accurately into dished plates of wrought or " cast iron, which are recessed or hollowed in a dovetail form to " receive them; or the ends may be secured by a plate of wrought " iron beneath the joint, plain, or turned up at the lateral edges, " and secured by pins or bolts, with or without bridle pieces, or

" with dog bolts passed through the lugs or flanges, and through
" the plates, and through or into the sleeper or timber bearing,
" thus binding the whole together; or the tail ends may be fastened
" down to the timber bearers without the intervention of
" an iron plate. The intermediate lugs or flanges are also pinned
" or bolted to the timber bearers or sleepers, holes or key ways
" being made in them for that purpose."

" Also to a mode of securing rail ends, by dovetailing or interlocking
" the same, in combination with a chair, in one or two
" parts, either of wrought or cast iron, and which chair may be
" so formed as to secure as well as support the rail ends together,
" in some cases with, in others without, the intervention of
" screwed bolts, keys, or hollow plugs, which when screwed up,
" or driven hot, will by the contraction of the metal in cooling,
" bind together, and render the whole more secure and safe than
" by the ordinary process adopted."

[Printed, 10d. Drawing.]

A.D. 1856, June 10.—Nº 1378.

PARSONS, Perceval Moses.—" Certain improvements in the
" permanent way of railways."

Constructing the rails of improved forms, " which afford a
" sufficient amount of bearing surface and vertical stiffness, and
" at the same time admit of being easily manufactured."

" The first form consists of a vertical or nearly vertical web,
" with a bearing flange branching out from it horizontally on
" each side, one at a different level from the other. The web is
" surmounted by a head or table for the wheels to run on, and
" it may also have one at the bottom."

" The second form consists of a vertical web, surmounted by a
" single head or table. The web is cut through vertically to
" within a short distance of the head into plates or strips, which
" are bent up on each side alternately, so as to form horizontal
" bearing plates . . . . one being left occasionally in its vertical
" position to sustain lateral pressure."

" The chairs or other supports or connections " are constructed
" with an adjusting piece, having a spherical curved or doubly
" inclined surface fitting against a corresponding surface on the
" side of the jaw of the chair, support or connection for the key
" or other fastening, or the rails, to bear against in such a manner

" that it will adjust itself, or admit of adjustment, to the taper of " the key or chair, inaccuracies in the castings, or difference in " the size of the rails, as also if required to their vertical inclina- " tion, and thereby ensure a fair distribution of the strain at each " end of the chair, and an equal grip of the two rails when " applied at a joint. The keys and other similar fastenings are " constructed in two or more parts, fitting together with spherical, " curved, or doubly inclined surfaces in a similar manner, so that " by varying their relative position, similar results may be " obtained, when they are applied to ordinary chairs; by these " means iron keys and similar fastenings may be used with suc- " cess; and when keys are of cast iron, tongues or strips of " wrought iron or other malleable metal" are attached to them, " which by being bent out after the key is driven, will prevent it " from withdrawing."

"Iron keys are also constructed, and also metal frames to be " used in chairs, in connection with iron keys, with chambers or " recesses filled in with wood, and wood crossways of the grain, " to act as a cushion between the metal surfaces, the inside of " the chair or adjusting piece" is made "when such keys or " ordinary wood keys are employed with jags or barbs to take " into the wood, and thereby afford additional security against " the keys withdrawing." Trenails are also cased in iron ferrules to prevent shearing.

"Fish chairs, fish brackets, and other similar fastenings with " the fishing plates" are constructed "separate from the chairs, " brackets, or other medium for connecting them and the rails to " the sleepers, but secured together by screw bolts, and" the " screw bolts and nuts for securing fishing plates, or fish chairs, " or brackets to the rails" are made "with one or both faces of " the thread square with or at any angle greater than 75 degrees " with the longitudinal centre of the bolt, and the bearing sur- " face of the heads and nuts of a conical or spherical form fitting " into corresponding recesses in the fishing plates, chairs, or " brackets, so as to diminish the strain and wear on the thread " and the chance of the nuts getting loose."

[Printed, 1*s*. 6*d*. Drawing.]

A.D. 1856, June 11.—No 1383.

***JAMES*, Henry Benson**.—" Improvements in moulding metal- " lic castings."

The patentee says, "I propose to mould railway chairs or other "castings with counter sinkings, or with holes or cavities of any "form or shape. In order to effect this, I propose to attach to "the pattern shifting pieces of metal or other substance, of any "form or shape, according to the cavity, perforation, or moulding "required to be produced. These pieces are to work or slide in "grooves made in the pattern, and are to possess projections or "stops corresponding with and fitting into said grooves (or vice "versa), so that when the pattern is raised from the moulding "box nearly to its full height, the stops shall catch in the ends "of the grooves, and so lift the said shifting pieces out of the "mould with the pattern; or the grooves and stops may be "dispensed with, thus allowing the said pieces to remain in the "mould after the pattern has been withdrawn, and then to be "removed from the moulding box previous to the metal being "poured in."

The patentee also claims a "core protector" and a method of constructing chair patterns "with two pieces of metal or other "substance, shaped to and forming the opening of the rail, and "having but one joint."

[Printed, 10*d*. Drawing.]

A.D. 1856, June 16.—Nº 1419.

BARLOW, William Henry, and WOODHOUSE, William Henry.—"Improvements in connecting and securing the ends "of rails of railways."

"For these purposes the chairs employed are each made in two "parts. The interior of the chair is formed to receive two 'fish' "plates in addition to the rail, and a screw bolt passes through "the two jaws of the chair, through the rail, and through the "two 'fish' plates; where joint chairs are used, the chairs are "made wide, and have two holes through each of the jaws for "screw bolts, so that one bolt passes through the end of each "rail as well as through the 'fish' plates and the jaws of the "chair. The 'fish' plates are also bolted to the rails by other "screw bolts passing through them." It is found "advantageous, "when using 'fish' plates in connecting the ends of rails "of railways, to employ plates with two or more female screws "therein in place of separate nuts for each screw bolt used."

[Printed, 10*d*. Drawing.]

A.D. 1856, June 17.—N° 1431.

BAYNTON, WILLIAM.—(*Provisional protection only.*)—"Im-
" provements in rolling rails for railways."

"The invention relates to the rolling of T rails, or rails the
" under side of which is flat; and it consists in arranging the
" rolls for rolling such rails so that each time that the rail is rolled
" flat, the under side of the rail shall be brought to a concave or
" hollow form, which hollow is again filled when the rail is rolled
" on edge by the metal which is displaced from the throat of the
" rail. In this way the flanges of T rails may be rolled sound
" when using a quantity of iron inferior to that now necessary.
" Sometimes also it is advantageous to hollow in a similar manner
" the head of the rail, particularly when the rail is more than
" usually throated in the middle."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 21.—N° 1463.

GILBEE, WILLIAM ARMAND. — (*A communication.*) — (*Provisional protection only.*)—" Improvements in locomotion on rail-
" roads, part of which improvements are also applicable to
" ordinary roads."

They consist, "firstly, in applying an extra wheel in the middle
" of the axletree of the locomotive."

"Secondly, in widening the crown of locomotive wheels, and
" in the employment of rails of hard wood, fitted close to the iron
" rails; these wooden rails present their fibres to the action of the
" crown of the wheels, which press on the rails. That part of the
" crown which presses on the wooden rail is provided with small
" sharp, conical steel blades, projecting out from the surface
" about three-quarters of an inch, more or less, the distance
" between the blades being about one inch and a half; these
" wooden rails may be used with advantage when horse power
" is applied for locomotion on cross roads communicating with
" small towns and villages. The wood may be steeped in a solu-
" tion of alumina or silicia, by which the rails can be made
" equal in hardness to iron, while the first expense will be
" much less."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 24.—N° 1479.

SAXBY, JOHN.—" A mode of working simultaneously the points
" *and signals of* railways at junctions, to prevent accidents."

The patentee claims under this invention the means "whereby
" the semaphore signals, the coloured glasses of the night signals,
" and the 'points' of each line are worked, by the motion of a
" single lever, or any mere modification thereof."

Levers are also provided by which the signals alone can be worked. Thus when the point and signal levers are in such a position that the up and down lines are clear, the signals of such lines may be operated by the separate levers for that purpose. If, however, the lever, say, of the "up" line be moved backward, the signal of the corresponding branch line and the points of the "up" line will be put in motion to open a communication and the signal of the main line put to danger. While the points remain open the signals of the "up" line cannot be altered, and consequently until the lever is returned and the main "up" line cleared the signal must continue at danger.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1856, July 2.—N° 1555.

HUMBER, WILLIAM.—(*Provisional protection only.*)—"Im-
" provements in the permanent way of railways."

The invention consists "in manufacturing chairs with the
" passage gradually diminished or tapered in two directions,
" namely, from the middle of the chair towards its two opposite
" sides, the passage being, as heretofore, entirely on one side of
" the rail when fitted in the chair." "Also in manufacturing
" metallic wedges or keys, which may be used with" the "im-
" proved chairs, and in securing rails within such chairs by a pair
" of wedges (to each chair) distended, separated, forced apart, or
" drawn away from each other in opposite directions by means of
" one or more distending wedges, keys, bolts, or other means
" of forcing or drawing them into their seats and there maintain-
" ing them, so as to prevent their becoming loose."

"And, also, in fishing or connecting together the contiguous
" ends of two rails, resting in or upon two of the improved chairs
" respectively, by means of a fishing plate on one side of the rails,
" having a wedge formed at either end, inclined in the same
" manner as above mentioned, and fitting into each chair respec-
" tively, and the plate being bolted or secured to one or both of
" the rails, a fishing plate on the opposite side of the rails being
" *either employed or not* employed, as may be preferred."

"Lastly, in securing rails in the improved chairs, or in any " other chairs, by wooden wedges or keys having bolts, rods, or " straps passing through them in the longitudinal direction of the " rails, whereby they may be held and maintained firmly in their " intended position."

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 9.—N° 1617.

KRUPP, Alfred.—(*Provisional protection only.*)—" Improve- " ments in the permanent way of railways."

The invention consists "in forming the rails of railways of two " distinct and separate parts, and making such parts of different " metals, ... to form a rail that shall combine great strength " and durability, while at the same time the cost is not materially " increased."

The metals used "are cast or wrought steel, and cast or " wrought iron, and the manner in which these parts " are combined together " so as to form a rail is as follows :—The lower " portion of the rail " is formed " of cast or wrought iron, of a " shape similar to the ordinary flange rail. The upper surface " of this portion of the rail is either formed with a groove, or " a portion is cut away upon one side, or upon both sides, so " as to admit of the upper surface being fitted thereto. This " upper surface " is made of steel, either cast steel or wrought steel, or " steel of any other kind that may be adapted for this " purpose."

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 10.—N° 1632.

PRINCE, Paul.—" Improvements in making moulds for casting " railway chairs and other articles."

"The invention consists of attaching any convenient number of " patterns of railway chairs or other articles to a 'turn-over plate' " part or parts of which may be connected by hinge joints or " slides, to facilitate certain portions of the patterns leaving the " mould. The turn-over plate with the patterns is fixed or " attached by joints on one end of a bar, which bar, at a convenient point in its length, rests on a bearing joint or hinge, " constructed to admit of the bar being moved by its own axis, ' vertically and laterally, perpendicular to the centre by motion.

"On the other end of the bar is placed a counterpoise or "weight, to balance as much of the patterns and turn-over plate "as is required. A circular moulding bench is recommended, "the centre of it to be the point on which the bar rests, the "turnover plate and patterns extending to and corresponding "with it."

[Printed, 10*d*. Drawing.]

A.D. 1856, July 12.—N° 1647.

ADAMS, WILLIAM BRIDGES.—"Improvements in the permanent way of railways."

The patentee claims "the construction of rails, either single or "double headed, with one solid and two supplementary webs, "bolted, screwed, or rivetted together, and breaking joint with each "other, the rails being either broad-footed or fixed in chairs, or "by brackets or knees."

"The construction and application of a bar or plate of metal "turned up at the ends to keep the feet of the brackets together."

"The undercutting of the shoulders of the side channels of rails "performed either by cutting machines or by rolling lips, after"wards pressed inwards with packing bars, for the purpose of "reversing, and also for saving thickness on the head of the rail; "also, the pitching upwards of the side wings of the angle "brackets to form channels next the rail heads; also, rolling "shoulders on the upper side of the angle brackets, to give depth "to wheel flanges, with light heads to the rails; also, the single "head rail with undercut channels below and wings pitched "upwards."

"Forming upper shoulders to angle brackets against the rail "heads, and turning the edges up or down or otherwise "strengthening them by thickening, together with the upwards "pitch, forming safety treads and breaks for the wheels in case "of their getting off the rail."

"Girder rails formed by cast or wrought T angle brackets, also "the application of planks of timber under the angle brackets "to widen the bearing or to prevent hardness, such planks being "either fixed or loose; also the double-headed girder rail with "enlarged head bearings, to prevent pressing into the longitudinal "timbers, bolted in the side channels, such rails being formed "*with a single head.*"

"The construction of girder rails, formed of a bridge or foot "rail with a flat bearing plate, and a vertical T angle bearer."

"The construction, use, and application of bridge rails with "joint connections or similar rails, ... the flanges being "rolled as wide as may be desirable for bearing surface, and the "wheel flange running in the channel, also of double-headed rails, "or similar rails, laid down flatwise, and connected by joints for "wheels to run in the channels without flanges; also the converse "plan of ribbed rails with double flanges to the wheels, so "that in either case the wheels . . . . may be guided by "one rail only, while the opposite wheels may run on plain "surfaces."

"The cutting out or pressing square, or nearly square and flat "surfaces on that portion of the rails which are to be connected "by fishes or brackets, to keep them firm without stress on the "bolts."

"Applying supports of elastic steel recessed into chairs for rails "to rest on, and prevent the effects of blows tending to crystallize "the rails."

"Securing the bolts used to connect rails and fishes, or brackets, "or chairs, or angle brackets by wedging, and" a "peculiar "form of fishes; and the use of rails with square or nearly "square side channels rolled the whole length of the rails, in "order to apply angle bearing plates, break joint, and keyed "bolts, ... and tie bars of iron similar to those used "for girder rails, being used to connect them."

"The undercut form of bolt heads and nuts, so as to receive "wedges, and the wedges and plates and lock plates, to prevent "the bolts and nuts or screw heads from working loose, and" a "conical washer."

"The elastic headed three and four webbed spikes for chairs "and brackets, and the oblong section spikes cut one out of the "other."

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1856, July 21.—N° 1720.

RICHARDSON, ROBERT, and BILLUPS, JONATHAN EDWIN.—"Improvements in the permanent way of railways."

They consist of "applying left and right-handed screws in "*combination* when fixing the ends of rails by fishing plates,

" also when fixing the parts of chairs or supports together, also
" when fixing rails to chairs with or without fishing plates, and
" also when fixing rails in chairs by wedges."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1856, July 30.—Nº 1799.

SIEVIER, Robert William.—" Improvements in preserving
" wood from decay and also from destruction by insects."

The patentee says, " My invention consists in subjecting timber
" or wood, when saturated . . . . with materials used for
" preserving it, to pressure, ... so as to compress the
" substance thereof and close up the interstitial spaces ; . . . .
" the result being that the wood is rendered perfectly impervious
" to the decaying influence of air or water, and the attacks of
" insects, while at the same time it is rendered more dense and
" more durable."

The wood or timber, after being treated according to this invention, is " applicable to railway sleepers, to timber for the
" construction of bridges, viaducts, breakwaters, ships, and other
" objects where strength and durability are desiderata."

[Printed, 4*d*. No Drawings.]

A.D. 1856, August 15.—Nº 1908.

HURRY, Henry Columbus.—" Improvements in railway crossings."

" The substitution of the continuation of the main line rail
" unbroken through the crossing for the present ' point and wing
" rails,' and passing the wheels of carriages, &c., when traversing
" a crossing over the main line rail, by which is removed the present gap or break in the main line, and the consequent danger
" and wear and tear."

" A moveable packing " is used " to fill the space necessary for
" the flanges of wheels traversing the continuous rail upon which
" the wheels can travel across such space."

The packing is constructed in such a way that " if left wrong,
" wheels traversing the continuous rail will pass over such packing
" without danger."

The patentee moreover claims " the depression or bending down
" of the ends of the rails in such a way as to allow wheels which

" have not got flanges to pass along without a sudden drop or " blow."

"The construction of an efficient and simple crossing by the " use of a fixed packing, and the depressed or bent down ends of " the rail," and finally, " the construction of all crossings without " wing or elbow rails."

[Printed, 1*s*. Drawings.]

A.D. 1856, August 15.—N° 1909.

JOWETT, Henry Alfred.—(*Provisional protection only.*)— " Improvements in rails and railway chairs, and in the construction of railways."

First, as a substitute for the rails in use (especially the double or **H** rail,) a tubular rail is used, of four wearing surfaces, square in shape or slightly rounded, "being one-sixteenth of an " inch higher in the centre, and reduced down to nearly a round " edge."

" Secondly, more than one description of metal is used."

"Thirdly, in the place of the ordinary cast-iron chair," it is " proposed to employ " a plain wrought-iron bracket or angle " plate forged to the shape of the rail, with two or more holes in " each angle, two holes for spikes or bolts to be driven or screwed " into the transverse wooden sleeper, and the two or more holes " in the vertical angle;" and through them and the rail it is proposed to pass a bolt, and in the opposite side to screw on a nut joined as in the fish joint, thereby forming a chair as well as joining rail to rail.

Lastly, it is proposed partly to bed the rail in the sleeper for the purpose of canting it.

[Printed, 4*d*. No Drawings.]

A.D. 1856, August 30.—N° 2023.

GREGORY, John.—" An improved fish joint, or method of " connecting rails."

" The improvement consists in making the fish in one piece of " a clamp-like form, and sufficiently deep to allow of a wedge or " bearing piece to be inserted between the under side of the rail " and the bottom of the fishing piece; this wedge piece increases " the bearing surface and prevents fouling of the joints."

" The fish piece may be made of cast or malleable iron. Cotter " *pins and bolts,* or bolts and nuts may be used for fastening

" together the fishing piece and the rail ends. The keys or wedges
" may be of wood, iron, or any other suitable material."

[Printed, 8d. Drawings.]

A.D. 1856, September 1.—N° 2026.

BOWRA, Matthias Edward.—" Improvements in the laying
" or placing of rails or chairs, for railway and other purposes, in
" the shape of beds or springs or elastic sleepers."

" In forming an elastic bearing in or under the sleepers employed
" in railways, and in enclosing such bearing within a
" frame or box, whereby the same is wholly or partially protected
" from the atmosphere and external influences, and is prevented
" from spreading out."

" And in constructing sleepers of hardened rubber, vulcanite,
" or other suitable elastic material."

" When metal springs are employed in lieu of the layers of
" elastic material before described, they should be coated with
" some preserving material or composition, in order as far as
" possible to prevent the oxidation thereof."

India rubber washers are also to be fitted to the nuts of the holding down bolts.

[Printed, 10d. Drawing.]

A.D. 1856, September 20.—N° 2213.

RAMMELL, Thomas Webster.—" Improvements in constructing
" railways and propelling carriages thereon."

The improvements relate to the construction and working of railways to pass through cities and town. For these purposes it is constructed on and supported by pillars, at a height above the heads of persons walking on the pavements. The pillars are to be fixed near the kerb stones of the footways, each line of railway being carried by a single line of pillars."

The means of traction or propulsion preferred is the atmo-
" spheric, the traction tubes being carried by the pillars.

The traction pipe is to be divided into sections at the stations, so that a carriage cannot proceed till the next section has been exhausted. Thus trains may be continually moving on this " endless " line, and never approaching each other nearer than the distance between two stations,

[Printed, 1s. 9d. Drawings.]

A.D. 1856, September 20.—N° 2214.

ROBERTS, John, and BEECH, James.—"A new or improved "railway chair."

The chair is made in two pieces, one consisting of a bed plate to be attached to the sleeper, the bed plate carrying a fixed cheek against which one of the vertical sides of the rail bears. A second loose cheek is provided with a dovetail, which dovetail engages in a slide in the bed plate. The bed plate and its fixed cheek are fastened to the sleeper by a railway pin or spike, and the rail being put in its place bears against the fixed cheek. The moveable cheek is now made to engage and slide in the bed plate until it bears against the rail.

The rail is thus held firmly between the fixed and moveable cheeks of the chair, and a pin or spike being passed through the moveable cheek and that part of the bed plate on which the moveable chair works, the cheek is fixed in its place and the fastening completed. Between the moveable chair and the rail, a layer of felt, leather, or other flexible material may be placed, in order to give the moveable cheek more exact bearing on the rail.

[Printed, 6*d*. Drawing.]

A.D. 1856, September 24.—N° 2237.

BARLOW, Peter William.—"Improvements in the perma- "nent way of railways."

"This invention consists in supporting or holding the rails of "railways by means of wooden chairs or supports, such wooden "chairs or supports being placed at intervals on and supported "by iron sleepers; or such wooden chairs may be used in con- "nection with wooden sleepers if preferred."

"It is preferred to make the wooden chairs in two halves, which "are attached to the sleeper and made to nip the rail by means "of diagonal bolts or fastenings" passing "through the parts of "the chair and into or through the sleeper. By means of these "diagonal bolts the chairs can be caused to traverse on the "sleeper to adjust the guage when necessary." It also consists "in using with metal chairs made in two halves or parts, and "supporting the rail at intervals, cushions of wood, placed on "each side of and under the rail, so that the chairs in place of "*supporting and* holding the rail directly embrace the cushions "*of wood by which* it is surrounded; and the chairs used with

" the cushions of wood, as above described, may either be made
" separate from the sleepers, or they may be cast on to and form
" part of metal sleepers."

[*Printed*, 6*d*. Drawing.]

A.D. 1856, September 25.—Nº 2247.

SABATIER, Etienne.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

Switches worked by the engine driver. The invention consists
" in having before and behind the switches on both sides of the
" track two rocker arms, acting on the switches by a suitable
" combination of levers, and in such manner, that whenever the
" locomotive in passing over the line lowers the rocker arms of
" the side towards which the train is directed, the moveable part
" of the switches is carried towards the opposite side of the track,
" and at the same time rises the rocker arms of the opposite side
" in such manner, that another locomotive going towards or
" coming from this opposite side will find the rocker arms ready
" to act in the opposite direction. The two rocker arms of each
" side of the track rise or descend simultaneously. A portion of
" each of the switches is moveable. The locomotive or the cars
" are provided at each side with a moveable piece for lowering the
" rocker arms."

[Printed, 4*d*. No Drawings.]

A.D. 1856, September 29.—Nº 2283.

RAMIÉ, Charles William.—" Improvements in constructing the permanent way of railways."

The patentee says " My invention consists, firstly, in an improvement upon my Patent, dated April 4th 1856, which
" improvement consists in using with the wings or plates placed
" longitudinally and inclined upwards to form sleepers . . . .
" chairs or brackets for securing the rails."

" Secondly, in the application of cross sleepers of malleable
" iron, the sides of which incline upwards, and are connected to
" the rails either with or without the intervention of chairs or
" brackets."

" Thirdly, in the application of the aforesaid wings or plates,
" placed at intervals longitudinally, and alternated with cross
" sleepers of malleable iron, the sides of which incline upwards."

" And lastly, in a mode of jointing the ends of the rails, where " they abut or come together, by means of a key inserted in " their respective ends, and held in its position by side plates, " thus ensuring the accurate junction of the ends of the rails. The " side plates described are retained in position by and at the same " time form beds for the keys, by which the rails are secured to " the sleepers."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1856, October 7.—N° 2339.

SMITH, THOMAS BRIGGS.—(*Provisional protection only.*)—" Improvements in the permanent way of railways, and in the running of railway carriages."

The invention consists " in combining with the track now used " another track upon which the carriages shall slide, after the " manner of sleds. This combination may be made in various " ways, by forming the rail with the two tracks, or by using two " distinct sets of rails, constructed the one for the wheel track " and the other for the sliding track, whether the set consists of " one or more tracks; also in placing the carriages upon runners " like sleds; also in the application of compositions or amalgams " to form the surface of the sliding track, and the surface of the " runners in contact with the track, so that by the mediation of " water or other suitable lubricator, the surfaces shall be made to " offer the least friction in the passage of the carriage over the " track."

[Printed, 4*d.* No Drawings.]

A.D. 1856, October 27.—N° 2519.

ALLAN, THOMAS.—" Improvements in the permanent way of " railways."

The invention consists " in constructing each line of rails in two " parts, bolted together, and united in such manner that the " lengths of each half of the rail break joint with the lengths " forming the corresponding half. Each separate length is rolled " or cast with two flanges in the form of girders, one to rest upon " or lie level with the ballast and form the sleeper, and the other " to descend vertically into it. " At the junction of the lengths " *of half rails* the small ends of the girders, both laterally and " vertically, are bolted to the corresponding half (to complete the

" rail) at the broadest and strongest part thereof in both direc-
" tions. It will be necessary at intervals to bolt the two lines
" together by means of tie bars to ensure their parallelism."

[Printed, 10*d*. Drawing.]

A.D. 1856, October 28.—N° 2530.

ARMSTRONG, Joseph.—" Improvements in the permanent
" way of railways."

The patentee says, " My improvements consist in making the
" wing and point rails of crossings all in one piece of cast steel,
" or . . . , other suitable material, and which are cast or made
" double headed, ... so that when one side is worn out it can
" be turned over and used on the other side. I construct the
" ends of the crossing so that fish plates can be used to con-
" nect the crossing to the rails at each end. My improved cros-
" sings are further so constructed that the flanges of the wheels
" running thereon take a bearing in passing off the point rail on
" to the wing rail."

Secondly, in " constructing a girder rail with two side brackets
" or bearing pieces on each side of the rail, the side brackets
" forming a taper recess in the side of the rail, wherein corre-
" sponding shaped pieces of timber are forced and held in by
" bolts, upon which pieces of wood the rails rest."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1856, November 3.—N° 2575.

JOBSON, John.—(*Provisional protection only.*) — " Improve-
" ments in the manufacture of railway chairs."

The invention relates to " improvements in or modifications of
" apparatus for producing moulds for casting railway chairs,
" for which certain letters patent were granted to " the inventor,
" November 23rd, 1855, in which the patterns were described
" with sliding pieces, by withdrawing which recesses were left,
" into which other moveable pieces were caused to withdraw,
" so as to admit of the mould being removed from the pattern.
" These last-mentioned moveable pieces were . . . . guided in
" two different ways, (viz.,) by turning upon pins or by being
" mounted upon levers like a parallel ruler."

By the present invention these parts are controlled " by slides
" *or by slotted plates* or other guides, which guides may be of

" rectilinear or angular, or curved, or mixed form, or so con-
" structed and arranged that the moveable pieces may be made
" to withdraw in various directions, as may be required. When
" an overhanging part or lip is required on the jaw of the chair,"
such part is caused "to be withdrawn into a recess in one of the
" moveable parts of the pattern, and then they are withdrawn
" together."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 4.—N° 2585.

BESSEMER, Henry.—" Improvements in the manufacture of
" rails or railway bars and axles."

"The object is to improve the quality of railway bars by the
" combination of certain peculiar qualities or kinds of iron or
" steel with iron of another kind or quality, and also in the mode
" by which such metals are united to form a bar."

In all cases that part of the railway bar on which the wheel rolls is formed of " malleable cast metal of a quality varying from
" and inclusive of hard or highly carbonized steel down to soft
" decarbonized iron which is manufactured of unpuddled metals,
" such as is described in the specifications of" the inventor's
" former patents, and manufactured by the processes therein
" described, or by means analogous thereto."

The metal preferred " to combine with any of the above kinds
" of cast malleable iron or steel is a fibrous, tough, laminated bar
" iron produced by puddling and rolling or hammering in the
" ordinary way, or produced by rolling a pile of puddled iron,
" or by rolling or by piling and re-rolling ingots or masses of
" cast malleable iron." The mode by which the different qualities of metal are united is as follows:—

" A bar or slab of puddled bar or twice worked or piled iron
" of a suitable size is heated to a red or white heat, and inserted
" in an ingot mould either in the centre or at one side of it; the
" fluid iron or steel from the converting vessel is then allowed to
" flow into the mould, the stream being by preference directed
" against the hot bar or slab with which it will unite, and may
" then be rolled into the desired sectional form of the kind of
" railway bar required, or in lieu of this mode of uniting the cast
" and rolled metal, the cast ingot may form part of a pile with
" *puddle bar, or* with previously rolled, or piled, cast, or puddled

"metal, or the ingot may first be rolled and then piled with "puddled iron.

"The second part relates to the manufacture of railway axles, "and is to be carried out in a similar manner."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 5.—N° 2600.

KEELING, Herbert.—"An improvement in rivetting fish "joints and other parts of the permanent way of railways."

The invention consists "in punching, drilling, or otherwise "forming conical holes, either round, polygonal, or of other form, "in fishing plates used for securing the ends of rails on railways, "and inserting in such holes rivets or pieces of iron, or other "suitable material, of a cylindrical or other appropriate form," and which it is preferred "to use cold. The rivets should be "sufficiently long to project beyond the outside of the fishing "plates, and by hammering upon the ends of the rivets until "they are expanded into the conical holes, the fishing plates "become securely fixed to each other, and hold the rails tightly "between them. In order to facilitate the removal of the fishing "plates when required, one end of the rivets" is made "in the "shape of an ordinary bolt or rivet head, the holes" are made "parallel in one of the fishing plates, the other being made "conical or tapering. On the removal of the projecting head "the remaining portion of the rivet may be readily driven out."

[Printed, 6*d*. Drawing.]

A.D. 1856, November 13.—N° 2673.

TREEBY, Thomas Wright Gardener.—(*Provisional protection only.*)—"Forming sewers or tunnels and gulleys to sewers."

In forming a sewer or tunnel, the patentee lays down an invert of "cast iron or other material," upon which are cast or laid the rails which form the railway to take away the earth. On the rails a centre is framed, which can be moved forward as the earth is removed. Ventilating tubes are laid along the invert.

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 14.—N° 2681.

COCHRANE, William Erskine.—"Improvements in the "*permanent way of railways.*"

They consist in "securing the ends of the rails at their junction
" with each other, by the introduction of a dowel key or tongue
" into the narrow part of the rail, extending partly into the end
" of one, and partly into the other, and secured in its place by
" the common wood wedge, which presses against it." Also in
an "improvement on a cast-iron railway sleeper, for which a
" patent was granted, and enrolled March 5th, 1851," which
" consists in discontinuing the vertical ribs or wooden sleeper
" holders cast on the upper surface of the plate, and placing them
" below the surface of the said plate." Also in lowering the
" heel or foot of the jaws or moveable rail holders to the under
" part of the plate, and in some instances" substituting "cocoa
" nut fibre or other suitable substance to take off the concussion,
" in lieu of the wooden sleeper or cushion."

[Printed, 10*d*. Drawing.]

A.D. 1856, November 14.—N° 2695.

BINKS, CHRISTOPHER.—"Improvements in converting iron
" into steel, and in giving a coating of steel to iron."

The invention consists "in converting masses of iron into steel,
" either wholly or superficially, by the use and application of
" certain cyanogen compounds or other materials containing and
" capable of imparting to the iron both nitrogen and carbon, or
" either, according to the quality or composition of the iron
" operated upon; such converting compounds or materials being
" sprinkled upon or otherwise applied to the surface of the iron
" as it passes through the rolling mill or under the hammer, or
" is subjected to a mechanical action of any other kind, whereby
" fresh surfaces of the metal are developed and presented to the
" action of the converting compound, till it either wholly or
" partially converts the iron into steel."

And also "in effecting the cementation of iron in its conversion
" into steel, namely, by exposing the iron to the action of certain
" compounds of cyanogen or of other materials containing and
" capable of yielding to the heated metal the elements nitrogen
" and carbon, for its complete conversion into steel."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 18.—N° 2723.

***BUTTERWORTH*, RICHARD.**—"Improvements in the means of
" *securing the ends* of rails for railways."

"The object is to secure the ends of the rails in such a manner
" as to keep the joint perfectly level, and to prevent the possi-
" bility of one rail rising above the other."

"The ends of the rail form a 'butt joint,' and in the end of each
" rail a semicircular notch is cut in the web, so that when the
" ends are placed together the two notches form a circular hole."
In this a circular key of wrought iron, the same thickness as the web of the rail, is placed. "When the joint is supported in
" a chair the ordinary wooden wedge or key, which secures the
" ends of the rails in the chair, also keeps the circular key above
" named in its place, thus making the joint perfectly secure.
" When the joints occur between the chairs, and the rails are
" 'fished,' the fishing pieces are provided with three bolt holes
" each, the centre bolt passing through a hole in the circular key,
" and the outer bolts each passing through a corresponding hole
" in the web of the rail near the end thereof." The same effect would be produced by making the hole and key of another form.
" The key also, instead of being loose, may be made of one
" piece with the solid side of the chair or with one of the fishing
" pieces."

[Printed, 6*d*. Drawing.]

A.D. 1856, November 20.—Nº 2748.

JOYCE, THOMAS FRANCIS.—" Improvements in joining, sup-
" porting, and strengthening the rails of railways."

"The invention consists of a casing to be applied to the lower
" head and body of the ordinary double-headed rail, for the pur-
" pose of forming an effectual junction of the ends of two rails, as
" well as for supporting and strengthening rails at points where
" the said rails require strength or support."

Plates of iron are formed of such a figure "that when two of
" them are bolted together, by flanges made on them for that
" purpose, the space between them has the figure of the lower
" head and body of an ordinary rail."

In applying the invention to rails the two plates are placed on the sides of the rails respectively, and bolted or riveted together at the flanges and where they lie against the body of the rail;
" the last-mentioned bolts pass also through the body of the rail,
" and firmly secure the said plates and rail together." Sometimes the flanges on the bottoms of the plates are dispensed with, and *the plates are made of* one piece of metal.

[Printed, 6d. Drawing.]

A.D. 1856, December 26.—N° 3065.

IRLAM, William.—" Improvements in the construction of " railway turntables and weighing cranes."

The invention consists " in making the outer curb or guard of " railway turntables of wrought-iron plates, instead of cast iron; " also in rivetting or otherwise attaching to such plates chairs to " support the annular rail for the turntable to revolve upon; " these annular rails may be made of ordinary wrought-iron rails, " or of cast iron. The revolving part of the turntable consists " of an outer ring made of the usual double-headed rail, or " otherwise bearing on the rollers of the live ring, and connected " by two wrought-iron girders on which the chairs for the cross " rails are fixed. The two girders are united at the centre by " means of a cast or wrought-iron beam for the centre pin, which " is made as usual."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1856, December 26.—N° 3071.

MITCHELL, William Lawrence.—(*Provisional protection only.*)—" Improvements in railway switch and signal apparatus."

" In constructing railway switch apparatus the two moveable " tongues of the main line and siding or branch are connected " together by a link or rod, which is pin-jointed to each tongue. " In the middle of the link which connects the two tongues is a " slotted opening, in which a crank pin of a crank on an upright " axis works, and by which the position of the tongues may be " altered. On the upper part of the upright axis is a cross head " having curved sides, against which a projecting bolt or instru- " ment on the locomotive engine comes when it is desired to " change the position of the tongues. The projecting bolt or " instrument on the locomotive engine is moveable, so that the " engine man may in passing cause the switch apparatus to be " acted on or not." It may also be put over by hand.

Signal apparatus similarly acted upon by the engine is described. A ball running down an incline plane is used to restore the mechanism to its normal state, after the train's passage.

" In order to act on the signals of railways by the hand or pull- " over levers, the chain, in place of being made fast to the pulley, " *passes freely* through the pulley, and is kept tight by means of " *a weight; hence*, when the pulley is moved to wind on the

" chain and to give motion to the wire communicating with the
" signal, there will be no slack chain to take up, but the chain
" and wire in connection therewith will be at the proper tension,
" notwithstanding expansion, or contraction, or stretch, and the
" extent of movement of the pulley will be constant."

[Printed, 4d. No Drawings.]

1857.

A.D. 1857, January 15.—N° 130.

MUIR, Matthew Andrew, and McILWHAM, James.—
" Improvements in moulding or shaping metals."

"This invention relates to various mechanical arrangements,
" an improved general system or routine of procedure to be
" used for moulding or shaping articles in metal of different
" kinds. The several improvements are especially adapted for
" moulding or shaping railway chairs, and for such manufacture.
" The whole of the establishment in which these improvements
" are to be carried into practical effect is specially arranged for the
" purpose in all its details, from the melting furnace or cupola to
" the discharge of the casting from the mould."

[Printed, 1s. Drawing.]

A.D. 1857, January 20.—N° 169.

BARLOW, William Henry, and WOODHOUSE, Henry.—
" Improvements in the permanent way of railways." " consisting
" in a method of attaching rails to their sleepers, for which pur-
" pose clamps of metal " are employed, " having their ends turned
" inwards, so as to embrace the sleeper and pass over and clip the
" bottom flange of the rail. These side clamps are secured to the
" sleeper by a bolt passing through the clamps and the sleeper,
" or otherwise. To support the ends of railway rails when such
" ends are 'fished,' two one-jaw chairs " are employed, " one
" placed at each end of the fish plates, and the rails and fish
" plates are fastened to the jaw of the chair by means of bolts
" passing through them. If flat-bottomed rails are used without
" chairs, the fish plates " are lengthened " so as to let them rest
" at each end over the sleepers, or the sleepers " are put " closer

" together with the same object. When transverse sleepers of " cast iron" are used, "such sleepers are made in halves or por- " tions, which are coupled or bolted together between the lines of " rails. And when using chairs with transverse sleepers, the " under parts" are formed "with projecting plates attached " thereto, and turning downwards, so as to form a saddle and fit " over the sleepers, thus protecting it from damage by the plate- " layer's tools, and extending the bearing surface of the chair on " the sleeper, and the projecting plates may be further extended ' to bear on the ballast, and when this is done the size of the " sleeper may be diminished."

The inventors use a fish plate bolted to the chair, the chairs having V-shaped openings into which the fish plates fit. "The " fish plates are formed with inclines at the back, so as to corre- " spond with the inclines inside the chair, and bolts pass verti- " cally through the backs of the fish plates to the under part of " the chair." When the bolts are tightened the inclines force the plates up to the rails.

[Printed, 10*d*. Drawing.]

A.D. 1857, January 28.—N° 259.

CHAMBERLIN, HENRY, junior.—" Improvements in paving " or covering the surfaces of roads, streets, or ways."

The invention consists in covering streets with a grated surface of cast iron, capable of forming a good foothold for horses. The ribs of the grating may run parallel and transverse to the street, or diagonally, but the former is preferred, as a smooth surface is thereby presented on which narrow wheels may travel. Rails may also be cast in one piece with the grated plates. In structures having longitudinal ribs, these rails may occupy the position of such ribs.

[Printed, 10*d*. Drawing.]

A.D. 1857, February 2.—N° 304.

MUIR, MATTHEW ANDREW, and McILWHAM, JAMES.— " Improvements in moulding or shaping metals."

It mainly consists of an improved arrangement for turning the platforms or carrying plates on which patterns of various kinds for castings in iron and other metal are or may be placed for conducting the operation of moulding or shaping metals.

The improvements are described as applicable to the moulding of chairs, sleepers, &c.

The principle embodied in this invention lies in supporting and holding the moulding plate or pattern in a horizontal position by means of four moveable screw pins, each couple acted upon by a central pin fitted with a pinion. "When the plate is required "to be stationary for ramming it is securely held by screwing "forward the four outside screw spindles, so as to bring their "ends to enter the four holes in the thickness of the plate." The central spindles are now clear of the plate. When the ramming is complete, "the moulder reverses the two handles of the central "spindles," causing them to advance to the plate, and the others to retire. When the central pins are screwed up, the others are clear, and "the whole may now be turned over, as well for the "release below of the box just rammed, as for the bringing up "of the reverse side of the plate" with its pattern, "for the "deposit of a mould box thereon."

A method is also described of moulding a hemispherical sleeper with its chair "disposed diametrically."

A "barrow or carriage" for removing castings is illustrated.

Part of the invention also relates to forming the cores for chair moulds.

A Disclaimer was filed by the patentee on the 27th of October 1858. It, however, does not affect this abridgement, and consists chiefly of verbal alterations.

[Printed, 1*s.* 0*d.* Drawings. Disclaimer, Printed, 6*d.* No Drawings.]

A.D. 1857, February 4.—N° 324.

DE BERGUE, CHARLES.—"Improvements in the method of "or apparatus for laying the permanent way of railways."

This invention is "more especially applicable to that description "of permanent way which is constructed of rails laid upon cast-"iron sleepers, which do not require separate chairs to be fixed "upon them, but consist of sleepers and chairs in one." It consists "in the fixing together the different parts of a length of "permanent way, preparatory to the laying the same on the "ballast." Also "in the manufacture and use of a framing "which has seatings, notches, pins, registering studs (adjustable "or otherwise), or other equivalent provision for placing a number "*of tie bars, or of sleepers*, or of both, in definite positions upon

" them, the said seatings, &c., being disposed upon the frame at " the required distances apart from each other, as regards the " length or run forwards, and as regards the gauge (one or both " of them), so that on placing the rails upon the sleepers whilst " in or upon the seatings, &c., they may be bolted, keyed, or " otherwise fixed together, of the required gauge, and in proper " positions, without the troublesome and tedious adjustment " attendant on the present mode of laying permanent way." The framing is fitted with broad wheels to run upon the ballast.

[Printed, 10*d*. Drawing.]

A.D. 1857, February 7.—N° 365.

PARSONS, Perceval Moses.—" Improvements in the per" manent way of railways."

" Packings or wedges of wood are arranged and placed in such " a manner that the end grain or fibre of the wood will be pre" sented to receive or sustain the strain or pressure caused by " securing or supporting the rails, or the weights imposed on " them, so that the strain or pressure will be intercepted by and " transferred from the rail to the chair-fastening support or " sleeper through these blocks, packings, or wedges, in the same " direction, or nearly so, as that in which the fibres of the wood " lie."

Various ways of securing and supporting the rails are shown.

[Printed, 1*s*. Drawing.]

A.D. 1857, February 14.—N° 444.

MOATE, Charles Robert.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

The invention has reference to the manufacture of cast-iron longitudinal sleepers for railways, whether simply sleepers or sleepers and chairs in one and the same piece, and consists in casting or constructing such sleepers and sleeper chairs with the metal disposed in the form of a tube or hollow casting, having a general triangular transverse section.

The improved sleepers and sleeper chairs may be cast either with or without special holes or other adaptation for fixing to *them tie bars for* preserving the gauge.

[Printed, 4d. No Drawings.]

A.D. 1857, February 16.—N° 455.

CLARK, William.—(*A communication.*) — "Improvements in "the manufacture of railway chairs."

Railway chairs are made in the form of a bar of wrought iron, in which the space to receive the rail forms a groove throughout its length. This bar is cut transversely at suitable distances apart to form a number of chairs, the cut parts forming the sides of the chairs.

[Printed, 10*d.* Drawing.]

A.D. 1857, February 21.—N° 512.

MIDDLETON, John, and STENT, William.—"Improve-"ments in railway chairs, and in the jointing of rails for "railways."

The chairs are made in parts of a peculiar shape, "so that one "part or loose cheek is made to slide into the other part in an "angular groove, cast in a slanting direction across the bed plate "of the chair, of which the fast cheek forms a part. The loose "part or cheek sliding in the angular groove has a wedge-like "action, and becomes tightened when driven across the bed plate, "and is thus secured in its place without a possibility of becom-"ing loose by means of an eccentric, wedge, or spike driven into "the sleeper, thus forming a solid and compact chair, which "gives an equal bearing or pressure to the rail. Another modi-"fication of the same consists in placing it in a line with the "bed plate instead of across it."

"The rails are jointed "where they come in contact by inserting "a double wedge, part of it into one rail and part into the other, "to keep them in contact and prevent their rising or separating."

[Printed, 1*s.* Drawings.]

A.D. 1857, February 24.—N° 538.

HAWKS, Stephen Wright.—(*Provisional protection only.*)—"Improvements in railway chairs."

The invention consists "in forming the chair in two separate "side pieces, rolled, forged, or cast to whatever section the shape "of the rail may require, one piece fitting on each side of the "rail, and a bolt or bolts being passed through suitable holes in "the rail and the two side pieces respectively, so as to connect "the three thicknesses of metal firmly together. These side

" pieces are also formed with a foot or lateral extension, so as to " rest on a bottom plate, to which they are firmly secured by a " bolt or bolts. The bottom plate is rolled with clips or jaws on " the outer edge to confine the chair laterally. The bottom of " the rail may rest on the central part of the bottom plate."

" At the junction of two ends of rails the length of the chair is " increased."

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 28.—N° 592.

TYLER, HENRY WHATLEY.—" Improvements in the permanent way of railways."

" A method of securing bolts and nuts by which the ends of " railway rails are bolted to fishing plates, when fishing plates " are employed;" and also those for " fixing railway rails to their " chairs or supports so as to prevent such bolts and nuts from " turning, and so becoming loose. For this purpose, bolts and " nuts " are used " in which the heads are made smaller on the " insides or parts which come against the fishing plates than on " the outsides, and in conjunction with bolts and nuts so made " a plate having notches cut in it to fit the smaller parts of the " heads of the bolts, or of the nuts," is used, " and when the " bolts and nuts are screwed up this plate " is driven " down " over such smaller parts of the heads of the bolts or nuts, and " the bolts and nuts are thus secured from turning until the " plate is removed."

[Printed, 10*d*. Drawings.]

A.D. 1857, March 3.—N° 625.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—(*Provisional protection only.*)—" Improved machinery for removing " snow from railways."

" This invention consists in an improvement on a snow plough " for which letters patent were granted " to the present inventor on " May 13th, 1856, and has for its object the adjustment of the " central vertical planes (described in that patent), so that the " snow on the track, after being raised up to the level of the sur- " rounding snow, can be all pressed or thrown over laterally on " *to either side*, as may be desired."

[*Printed*, 4*d*. No Drawings.]

A.D. 1857, March 5.—Nº 645.

GREAVES, Hugh.—"Improvements in the mode of coupling "or connecting pipes, columns, and conduits, in the machinery "for manufacturing the hoops to be used in connecting such "pipes and columns, and in the shape of such pipes, columns, "and conduits, whereby they become adapted for the support "and conveyance of vehicles."

"An improved method of joining pipes for the conveyance of "gas, water, or other fluids, or for any of the many purposes for "which pipes are usually employed; by which arrangement the "joints of such pipes or conduits are more efficiently and more "economically made. Also to the employment of such pipes "when combined with a cast-iron rail or tramway, either cast "with the pipes or fixed thereto, or with a wrought-iron rail "attached thereto, for the double purpose of conveying fluid or "other bodies, and as bearing surfaces for vehicles; likewise "to the joining of solid or hollow columns, and to the method of "manufacturing the conical collars or hoops used for connecting "the ends of such pipes, conduits, or columns."

[Printed, 8*d*. Drawing.]

A.D. 1857, March 9.—Nº 677.

HEMMING, Frederick Shand.—"Improvements in the "manufacture of railway chairs and sleepers."

It is proposed "to manufacture railway chairs and sleepers of "substances not hitherto so made use of, consisting of any suit-"able kind of animal or vegetable fibrous materials, such as "spent tan, spent hops, rags, paper, wood, hair, rope, and such "like matters."

"These substances are reduced to a dough or thick pulp, and "may be mixed with oil, tar, and other such products to render "them more cohesive; they are then put into moulds of the "required shape, and subjected to hydraulic or other similar "pressure."

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 9.—Nº 692.

BARLOW, William Henry, and SAMUEL, James.—"Im-"provements in cast-iron sleepers for railways."

"*The sleepers are* intended to be used longitudinally of the

" permanent way of a railway, and are cast, by preference of a " rectangular form. The upper surface has thereon a central " longitudinal trough, divided at intervals transversely by partitions . . . . for receiving wood or other soft material. On " either side of the walls constituting the trough there are at " intervals inclined buttresses, which are cast hollow on their " under sides. By reason of the trough-like form of the upper " surface provision may be made for receiving and fixing various " forms of rails securely."

"At intervals these sleepers have transverse projecting ribs both " on the under as well as on the upper surface. The rails are " fixed to these sleepers by means of peculiar chairs, which are " cast or formed at the under sides to correspond with the upper " surface of the sleepers. Each chair is formed to receive two " moveable jaws, consisting of hollow frames of iron, arranged " suitably for receiving a filling of wood shaped to fit the side of " the rail where the wood comes in contact with the rail."

[Printed, 10*d*. Drawing.]

A.D. 1857, March 10.—N° 701.

BAYLIS, CHARLES.—"An improved method of constructing " and arranging roads and ways, particularly applicable to populous cities and crowded thoroughfares."

"A rail or tramway" is combined "with roads or ways for " ordinary carriages and foot passengers in such a manner that " the traffic on both can be carried on independently and without " interfering with each other. Provision is also to be made for " the sewers, and also for the gas and water pipes and telegraph " wires, by excavating the ground to a suitable depth, and " building three tunnels side by side and parallel to each other. " In the centre one" is constructed "the main sewer for the " thoroughfare, and in the two side tunnels" it is proposed "to " place the gas and water pipes and the telegraph wires. In " order to gain access to these tunnels, apertures covered with " moveable metal or other plates or covers are made on the top " of the tunnels, and strong sheets or blocks of glass may be let " into the top of the tunnels at intervals, so as to admit light to " the interior."

"On the top of these tunnels" it is proposed "to construct two, " three, or more lines of railway for the use of locomotive engines

" and carriages; and immediately above the railways on the side
" tunnels, and at about the level of the present roads, to build the
" road or way for the ordinary traffic; but instead of covering
" over the subterraneous railway the whole width of the street,"
" it is proposed to leave an open space about six feet wide all
" down the centre of the thoroughfare. This will admit light
" and air to the railway beneath. In some cases, especially when
" the thoroughfare is restricted in width," it is proposed " to con-
" struct footways above the present footways, so that the whole
" width of the latter may be thrown into the carriageway and
" devoted to carriage traffic."

[Printed, 6*d*. Drawing.]

A.D. 1857, March 21.—Nº 790.

SEATON, William.—Improvements in the construction of the
" permanent way of railways, and in the machinery or apparatus
" employed therein."

" It is proposed to use longitudinal sleepers of rough baulks of
" timber, of a rectangular, semicircular, or other convenient sec-
" tion. These baulks of timber, after being sawn, are dressed or
" faced on their upper surface, so as to receive the flanges of the
" rail to be adapted thereto, the shaping being effected by means
" of rotatory cutters of any suitable shape required." It is also
proposed to construct " a roadway of longitudinal cast-iron sleepers,
" of a rectangular or semi-rounded section, to suit the bearing or
" flanges of the rail, a layer of suitable material being interposed
" between the bearing of the rail and the sleeper for the purpose of
" lessening the noise or sound produced by the transit of the
" trains, and also for causing less vibratory motion and increase-
" ing the smoothness and durability of the road."

One improved form of rails " consists in making the flange of
" the rail of a perfectly rectangular form."

" Another form consists of the ordinary bridge rail or common
" girder rail, constructed with rounded or concave flanges to suit
" the rounded or flattened form of the timber sleeper."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, March 21.—Nº 803.

HEMMING, Frederick Shand.—(*Provisional protection only.*)
—" *Improvements* in the mode of treating peat, mixed or not

" mixed with other vegetable or animal fibrous substances and in " the application of the same to various purposes."

The peat is prepared by triturating it well, and when necessary the earthy matters are removed. It is then mixed " with a quantity of other fibrous materials so as to increase its fibrous texture," then with " a combination of oil, resin, tar, india-rubber, " and gutta percha, one, all, or any of them in various proportions, resembling in some degree the constitution and possessing " the properties of 'marine glue.' The effect of it is to produce a " viscous tough mass, which, being put into moulds prepared " according to the form of the article to be made, is subjected to " hydraulic or other pressure, and allowed gradually to cool." It is proposed " to render it also non-inflammable by impregnating it " with any of the metallic salts known to possess that property."

It is proposed to make use of the peat, prepared in this way for manufacturing railway chairs and sleepers, and other similar articles.

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 21.—N° 805.

HEAD, THOMAS HOWARD, and WRIGHT, JOSEPH.—" Improvements in casting railway chairs, and in the manufacture of " other castings."

The moulding boxes are moved from one place to another " by " means of a moveable webb, working on rollers at each end, and " consisting of small bars of iron fixed on a chain at a few inches " apart, the ends of these pieces working in a guide cast on the " table at which the men work. On the ramming-up plate is " cast or fitted a small pin, which, when the ramming-up plate " is upon the table, catches in the movable webb and draws it " to where it is required. When it is required to be stopped, a " small lever is risen above the level of the table, worked by " an eccentric shaft and forming an inclined plane, up which the " webb pulls the plate till the pin clears the webb (which is " always moving), and by lowering the handles the pin is again " connected with the webb, and moves with the box and the " patterns to the next operator. There are two trunnions cast " upon the box, which passes between the wheels, the ramming-" up board being fastened to it by means of hasps. On these " *wheels are two* pockets, which take hold of the trunnions on

" the boxes, lifting the box and bottom board together; and on " arriving at the greatest height the box is tipped by means of a " piece projecting from the standards, and lowered again by the " wheels on to the table, where it is again connected by the means " before described on to the moveable webb."

[Printed, 1s. 2d. Drawings.]

A.D. 1857, March 26.—N° 852.

MORRIS, James.—"Certain improvements in connecting the " *rails of railways.*"

The invention consists " in providing in the sides or channels at " each end of each ' rail ' or length of rail in a line of rails a hole " or orifice, into which a piece of iron or other suitable metal is " driven or inserted, which then projects on each side of the rail " and has the ends thereof slotted." " And when two lengths, " each constructed as aforesaid, are brought end to end together " to form a line of rails, two screw bolts or bars are placed one on " each side of the rail in the recesses or slots," " one on each end of " each rail or length of rail, that is, longitudinally on each side of " the rail in the channels thereof, such screw bolts or bars having " each an enlarged part in the middle, and a right-handed thread " at one end and a left-handed thread at the other, on which " corresponding screw nuts are placed; and secured by screw " nuts."

" For better securing the ends of each rail or length of a line of " rails such rail or length may have a curvated or other suitably " shaped notch or cut made therein, which when two ends are " brought together form one complete orifice, into which a corresponding pin is to be inserted to secure the ends of the rails " from moving up and down."

[Printed, 8d. Drawing.]

A.D. 1857, March 28.—N° 868.

RUSSEL, Robert.—(*Provisional protection only.*)—" Improvements in railway turntables."

" Each turntable is constructed of four iron beams in the following manner:—Two beams, which may be called the lower " beams, are each made with two recesses or cranks in them, in " which are placed the two upper beams, so that the upper

" surfaces of the four beams are all in the same horizontal plane,
" the upper being at right angles to the lower. The rails are
" fixed on the upper surfaces of the four beams on suitable
" bearers, and the upper surface of the table is plated or planked
" over in any convenient manner." Each turntable is supported by four wheels, there being a suitable circular rail for the wheels to run on under the table. " The table may be connected with
" and turn on a central post in any convenient manner, but it is
" preferred to suspend a casting by suspension rods from a cap
" on the top of the post, and that such casting should receive
" and bear the four cranked parts of the under beams; or in
" place of the casting, four wrought-iron bearing plates may be
" used under such four bent parts of the beams, the bearing
" plates being suspended by four suspending rods from the cap
" on the post, the bearing plates being also connected near to
" the outer ends of the four beams by means of eight tie rods."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 2.—N° 917.

MAW, Edwin.—" An improvement in the construction of the
" points of railway crossings."

The invention consists in " applying what are called fish plates
" in combination with a steel point where the two rails of a
" railway crossing come together. For this purpose the point
" made up of steel comes up to or butts against the ends of the
" two rails where they come together, and the steel point and the
" ends of the two rails are fixed together by means of two fish
" plates, one on either side, screw bolts being passed through the
" fish plates and through the steel point, and also through the
" fish plates and the two ends of the rails, by which means and
" by screw nuts the whole are bolted securely together."

[Printed, 6*d*. Drawing.]

A.D. 1857, April 4.—N° 943.

LECLERCQ, Adolphe.—(*Provisional protection only.*)—" Certain improvements in sleepers of railways."

The patentee says the invention " consists in forming metal
" sleepers and chairs all in one piece. Metal sleepers have
" already been substituted for wood, but the sleepers and chairs "

have not been "formed in one piece of metal. The inside cheeks "of the chairs must be formed to suit the shape of the rail they "are to support."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 9.—N° 1011.

BEECH, John, and WILLIAMS, John.—"An improved mode "of securing the rails of railways in their chairs."

This relates to "an improved mode of retaining the keys or "wedges of railways in their place, and thus ensuring stability in "the railways, and applies more particularly to the keying of the "crossing rails in their chairs."

"In carrying out the invention" it is preferred "to use cast-"iron wedges with a hole through them to admit of the insertion "of a screw bolt. This bolt extends from the wedge of one chair "to the wedge of the next chair, and by the application of a lock "nut to the end of the bolt the two wedges will be drawn "together and caused to hold the rail firmly in place; or it may "be made to act on the wedges in the opposite way, and thrust "them apart."

[Printed, 6*d*. Drawing.]

A.D. 1857, April 13.—N° 1036.

RICHARDSON, Thomas, and BROWELL, Edmund John Jasper.—"Improvements in treating old or waste railway wood "sleepers and bearers, and in preparing or preserving wood for "railway sleepers and bearers, and other works."

The patentees say, "wood is employed for sleepers and bearers "of the rails, prepared by tar, or products obtained by distillation "from tar. Part of the invention consists in subjecting the old "or waste sleepers and bearers to the process of dry distillation, "to obtain tar or products therefrom suitable for preparing wood "for sleepers and bearers and other works." "And the improve-"ments also consist in combining with tar, used for preparing "or preserving wood for railway sleepers and bearers, and other "works, a chemical solvent, such as caustic soda solution."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 13.—N° 1047.

RAMSBOTTOM, JOHN.—"Improvements in wrought-iron rail-
" way chairs, and in machinery for manufacturing the same and
" other articles."

The improvements consist "in constructing railway chairs with
" two open jaws, between which the rail is supported; these jaws
" are somewhat wider above than below, and the spaces between
" the jaws and the rail are filled up by packing pieces; when the
" load comes upon the rail the packing pieces are wedged tightly
" between the jaws of the chair, thereby more securely holding
" the rail, owing to the elasticity of the chair. The wrought iron
" for making the chairs is rolled of the required section, and cut
" off to the proper length by means of the improved machinery."

[Printed, 1*s*. Drawings.]

A.D. 1857, April 22.—N° 1134.

TAYLOR, ROBERT, WORSWICK, RICHARD, and LOVATT, JOHN.—"Improvements in railway chairs and in the mode of
" securing the ends of rails therein."

"According to one arrangement, a peculiar form of joint chair"
is used "suitable either for the ordinary double or single T
" headed rail. This chair has a transverse opening made
" through each jaw, and is fitted or formed with an internal pro-
" jecting lip or shoulder, which serves to hold the ends of the rails
" steady in their position, by bearing against the web or sides
" thereof. The rail ends are slotted or notched transversely to
" correspond to the transverse opening through the chair, and
" a slightly wedge-shaped key or cottar is driven transversely
" through the chair and through the slots or notches in the rail
" ends, by which means they are held firmly down on to the bed
" or rail-bearing surface of the chair. The expansion of the rail
" is allowed for by making the slots rather wider than the key or
" cottar which passes through them."

The second arrangement relates to "suspended joints, such
" as are generally made when 'fish plates' are used. For this
" purpose" it is proposed "to use a clutch of cast iron, made to
" clip the lower edge or flange of the rail ends, whilst one of the
" jaws of the clutch is made to reach up and bear against one
" side of the web. A transverse opening is made through this

" clutch in such a position that when the rail ends are inserted, and " a cottar or cottars driven through it, the under sides of the rail " ends will bear upon such cottar or cottars, and will be forced up " firmly into the jaws of the clutch by driving the cottars home. " The joint is completed by passing a cottar or cottars or one " or more bolts or screws through the jaws of the clutch and " through the web of the rail ends."

[Printed, 10*d*. No Drawings.]

A.D. 1857, April 25.—N° 1169.

WHITE, WILLIAM.—(*Provisional protection only.*)—" Improve" ments in making moulds or matrices employed in casting " metals."

" Particularly applicable in the manufacture of railway chairs " and wheels, window weights and shot."

The improvements consist in "ramming the sand or other " material employed round the pattern by the aid of a press, in " place of effecting the same by hand. The mould boxes are " brought underneath the press and are rammed or packed by a " descending plate or ram. Two of these plates may be used, " the one rising as the other descends, and the boxes are carried " in and out of the press by means of self-acting travelling " tables."

" In some cases the under portion of the mould may be formed " by having the lower half of the pattern fixed to the pressing " plate and pressing it into the mould box filled with sand or " loam by the action of the press, whilst the upper half of the " mould is being made in a separate box by the second plate of " the press."

" The pouring hole or 'ingate' is made by a suitable projecting " pin on the pressing plate, which penetrates the mould on the " descent of the plate."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 12.—N° 1336.

BARLOW, WILLIAM HENRY, and **MILLS**, WILLIAM HEMINGWAY.—(*Provisional protection only.*)—" Improvements in " the permanent ways of railways."

" For these *purposes* cast-iron bearing plates are used, divided " *longitudinally*, and hinged together in such manner that the

" jaws or projections, which receive the rails between them, may " be allowed to move or open out a short distance from each " other to admit of wood keys, wedges, or filling pieces being " introduced between the jaws or holding projections and the " sides of the rails held between them, whereby, when the wood " keys, wedges, or filling pieces shrink or become loose, the pressure of the passing trains will, by reason of the hinging of the " bearing plates, cause the upper parts of the opposite jaws or " holding projections to come towards each other and clip the " rails and filling pieces tightly between them."

"In some cases, in place of casting the sleeper in two main " parts, the main portion of the sleeper is made in one casting, " and on its upper surface are formed two or more fixed jaws, " suitable for double-headed rails. A suitable recess is also " formed below the bearing head of the rail to receive wood or " other soft elastic material, and in order to support the other " side of the rail, opposite each fixed jaw there is hinged or " applied a moveable jaw, which is held down by a screw bolt or " otherwise to the other or main portion of the sleeper, and the " upper surface of each of such hinged or moveable jaw, as well " as of the fixed jaws, comes under the upper head of the rail, " whereby any depression of the rail will . . . . tend to make the " jaws hold the rail more tightly between them; and in order to " adjust the guage . . . . the tie bars are made with a slot on " each of their ends, and the screw bolts used therewith have " inclined sides, so that when such bolts are screwed up, the " inclines act on the ends of the slots in the tie bar, and so set " up or adjust the guage." Or slots may be made in the sleepers and the bolts " used to the tie bars."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 12.—N° 1339.

BROOMAN, RICHARD ARCHIBALD. — (*A communication.*)— " Improvements in the preparation of steel, and in the steeling " or manufacture of tyres, shafts, axles, and other forgings."

The invention has reference, firstly, to the preparation of steel bars, and, secondly, to the arrangement of such bars with iron bars, in faggots for the manufacture of steel-topped rails, &c. Three bars of good iron are taken, and on the top a band of the prepared steel is laid, and on the sides other bars of iron are placed. Over the top is placed a thin layer of iron, which is not absolutely essential, but it is found to be advantageous, to protect the steel from the injurious action of the air during the welding.

[Printed, 6*d*. Drawing.]

A.D. 1857, May 13.—N° 1349.

FITZ-GIBBON, ABRAHAM.—(*Provisional protection only.*)—"Improvements in the form of rails for use in railways and tramways."

"For these purposes, in place of rolling or forming the lower "or bearing flanges of rails for railways or tramways with "parallel sides, and making holes through such parallel flanges, "the lower or bearing flanges of the rails are formed with projecting lugs at intervals, through which the necessary holes are "made for receiving the screws, bolts, or other fastenings for "holding down such rails."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 20.—N° 1422.

HARRISSON, JOHN.—"Improvements in railway signals."

The invention "consists in connecting the signals with the "switch levers, so that the act of setting the switch throws the "signals into such a position as to prevent any train advancing "but that for which the switch is set." The signal arms are weighted, so that, when left to themselves, they indicate danger. When the switch is put over, the apparatus raises one of the weights and allows the arm to descend. The switches may be worked independently of the signals, but in that case, the switch rod being disconnected from the signal, the arm will necessarily stand at danger.

[Printed, 10*d*. Drawing.]

A.D. 1857, May 22.—N° 1445.

PARSONS, PERCIVAL MOSES.—(*Provisional protection only.*) —"Improvements in making moulds for casting railway chairs "and other articles in metal, and in apparatus for that purpose."

The invention consists "in so constructing, arranging, and "*applying the moulding* boxes, patterns, and apparatus in con-

" nection with them, that the mould formed by ramming the sand " or other moulding material into the box is separated or delivered " from the pattern by turning the moulding box containing it " around a centre or axis connected with or fixed in a suitable " relative position in respect to the pattern, or by turning the " pattern around a centre or axis fixed to or in a suitable relative " position in respect to the moulding box; also that the mould- " ing box may be inverted by turning it round the aforesaid " centre or axis as far as required."

"In moulding railway chairs, moveable pieces or chills are " employed when necessary, and so arranged that they will be " separated from the pattern by the circular movement of it; or " the box or the projecting parts of the patterns are formed by " sliding or moveable pieces, that are withdrawn previous to the " box or pattern being turned around the aforesaid centre or " axis."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 25.—N° 1472.

TYLER, Henry Whatley.—"Improvements in the permanent " way of railways."

The invention has for its object "an improved method of secur- " ing rails to their chairs, sleepers, or supports; and also of " securing the ends by means of fishing plates; and of securing " railway chairs to their sleepers or supports. For these pur- " poses bolts" are employed, "having plain stems and heads at " each end. The head at one end of each bolt is square, round, " or of other ordinary form, and the head at the other end is " made considerably wider in one direction than in the other. " The bolts are made of a length to suit the thickness of the " pieces which they are to secure, and in each of these pieces a " long and narrow hole is made, corresponding in form to the " oblong head of the bolt, and the pieces are firmly held together " by clips, while the bolts are put in and turned one quarter " round. The bolts are afterwards secured by sliding or placing " over their heads locking plates, which prevent them from " turning, for which method of securing the bolts a previous " patent has been granted" to him; "or they are secured from " turning by driving keys by the side of the bolts into the holes " in the parts connected by the bolts."

[Printed, 1s. 0d. Drawings.]

A.D. 1857, May 25.—Nº 1477.

AUBERT, Louis Désiré.—" Improvements in fastenings for " securing rails in the chairs."

" First, in uniting the rails end to end by means of iron dowel " or other pins, which project beyond the end of the one rail, " and are received into corresponding holes in the abutting rail. " Instead of two or more such pins being used, a deep flat pro- " jecting piece may be formed on the one rail, and a correspond- " ing recess formed in the other."

" In joining or disconnecting these rails they are slid when " loose in their chairs in the direction of their length." Further improvements consist in the use of " a fish plate fitted between " the wedge and the side of the rail at the joint, which fish plate " is furnished with projecting parts on the inside, which are " received into holes formed in the rib of the rail, and held " firmly therein by the wedge when it is driven tight in the chair. " The plate is curved to the form of the rail, and in the hollow " side receives the wedge and prevents it from rising out of the " chair."

[Printed, 8*d*. Drawing.]

A.D. 1857, May 28.—Nº 1514.

COX, Nathaniel. — (*A communication.*)—" Improvements in " railways."

" Two side rails or trams are laid down, on or in which the " wheels of the carriages run. A central corrugated rail is laid " between the other two rails. The driving wheel or wheels of " the engine run upon this central rail. This central rail may " extend the whole length of the railway, or only on steep " inclines."

" In lieu of a single central corrugated rail, two may be em- " ployed, either between the two side rails or outside them."

[Printed, 10*d*. Drawing.]

A.D. 1857, May 30.—Nº 1531.

RIDLEY, Ralph Errington.—(*Provisional protection only.*)— " Improvements in the permanent way of railways," consisting in " certain methods of constructing and combining the sleepers,

" chairs, and rails of railways, by means of which elastic mate-" rials may be more easily and efficiently combined therewith" than heretofore.

" According to one modification a longitudinal metallic sleeper" is formed, "having upon its upper side vertical ribs, which " include a space or chamber of any desirable depth; and in " combination with this sleeper a rail" is used, "having formed " upon its lower side vertical ribs, which, when the rail is in " place, clasp the ribs of the sleeper. In the space or chamber " between the ribs is placed a block of vulcanized india-rubber, " upon the upper surface of which the rail rests, and which will " yield slightly to the downward pressure of an engine or carriage running upon the rail, the ribs or sides of the chamber " at the same time prevent the india-rubber yielding too much " laterally."

Modifications are described.

[Printed, 6*d*. Drawing.]

A.D. 1857, June 5.—N° 1588.

MORRIS, James.—" Certain improvements in connecting the " rails of railways, and in supporting the same."

The invention consists "in having at each side of the rail, " near the junctions, cheek pieces placed in the channels of the " rails, and secured together by pins or bolts passing through " such plates, and also through the rails, and also having one " of these cheek pieces slotted near the centre to receive a corresponding screw bolt, which has an enlarged blank part passing through a slot formed between the joint of the rail; by " bringing together two grooves or cuts made in each of the ends " of the lengths of rail, the screw end of the said screw bolt " passing out at an orifice provided in the other check piece, and " being there secured by a screw nut, makes a firm junction of " the lengths of rail, securing the same from shifting vertically " or horizontally."

"For supporting the rail a chair is used, the peculiarity of " which is that the inner {projections of the chair are made " angular, so as to grip or cut into the bottom flange of the rail, " *and fastened* by a corresponding key or wedge."

[Printed, 1s. Drawings.]

A.D. 1857, June 11.—N° 1641.

CLARK, Josiah Latimer.—"Improvements in apparatus for "conveying letters or parcels between places by the pressure of "air and vacuum."

The invention comprises "improvements in telegraphs, in "which letters or other articles are conveyed through pipes by "pneumatic pressure." They consist in "making the joints in "the line of pipes in such a way as not to interfere with the "passage of the package, by causing the ends of the pipes to "butt together, and slipping a ring or short piece of tube of "vulcanized india-rubber or of any other air-tight material "over the joint, and the ends of the metal pipes are held accurately in their positions by a socket made in two halves, "connected together with screws, which socket covers the vulcanized india-rubber ring, and clips firmly the ends of the "pipes."

Also in a switch arrangement by which parcels are transferred from the main tube to branches. Also in a system of pumping in behind and exhausting in front of the parcel, and also in apparatus for facilitating stoppage and delivery at the end of the journey.

[Printed, 1s. Drawings.]

A.D. 1857, June 15.—N° 1667.

HEATON, Thomas.—"Improvements in self-acting doors and "gateways."

The patentee says, "This invention consists of improvements "upon an invention for which I obtained letters patent, March "24th, 1856."

"My present improvements consist of fixing horizontal levers at "each side of the passage or doorway turning on pivots; I curve "the said levers so that each of them nearly meet at their extreme "points, and pass through holes or apertures in the doors or "gates, in which holes or apertures I fix friction pullies to allow "the ends of the said levers to pass easily through them. The "doors or gates slide on cross bars or rails, so that when a horse "or anything comes in contact with the curved shafts, pressing "laterally against them, the pressure pushes the doors or gates "sideways into recesses prepared for them, which will remain "*there as long as there* is anything pressing against them; but

" the moment they are freed from the lateral pressure they will
" close of themselves, either by means of a simple pulley and
" weight to draw them back to their closed position, or by giving
" the horizontal or cross bars or rails on which they slide a slight
" incline from the centre."

"These self-acting doors or gates are applicable to mines, the
" private railways of collieries, hoists, public works, parks, and
" other similar purposes."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1857, June 19.—N° 1714.

HILL, Joseph.—(*Provisional protection only.*)—" Improvements
" in the permanent way of railways."

" The object of this invention is, firstly, to produce a form of
" rail to be fixed without chairs, the head or working surface of
" which can be replaced or renewed when worn out at a much
" less cost and trouble than the ordinary rail; and, secondly, a
" new form of rail, which does not require any wooden sleepers
" at all."

Various modifications of a rail are shown, in all cases the moveable top is secured to a wide base. The rail not requiring sleepers, is supported on angle iron plates.

[Printed, 6*d*. Drawing.]

A.D. 1857, June 19.—N° 1719.

NEWTON, William Edward. — (*A communication.*)—" Im-
" provements in the construction of railway crossings."

The invention consists in " a method of combining a flexible
" rail, which is fixed at one end, with a fixed rail and point, sup-
" porting chairs of a peculiar form being employed. The elasti-
" city of the moveable rail is made to keep it in its place, and
" still permit of its yielding sufficiently to allow the flange of the
" wheel to pass."

" Also in placing a stop opposite to the point of the crossing,
" for the purpose of supporting the rail at that point. The point
" of the moveable rail is also secured from rising out of place by
" means of a hook and rebated chair."

[*Printed, 6d.* Drawing.]

A.D. 1857, June 24.—Nº 1762.

VASSEROT, Charles Frédéric. (*A communication from Jean Claude Durand.*)—(*Letters Patent void for want of Final Specification.*)—"Improvements in the permanent way of railways."

A "chair intended for single-headed rails is composed of a bed, "which is sunk into and rests upon the sleeper, and on which the "base of the rail is supported. From this rises up the two sides "forming the channel for resisting the lateral thrust of the rail, "and which extending horizontally increase the bearing surface "of the chair on the sleeper. At about half way from the top to "the base of the sides or supports a semicircular groove is made "on each side, corresponding exactly with the semicircular grooves "of the rails."

"The chairs made for double-headed rails are of a similar con"struction, with this difference only, that the sides or supports "have two semicircular grooves made in each, instead of one. "The base of the chair is sunk in all its thickness into the sleeper, "and by means of two or three treenails or spikes placed at both "ends and in the centre of the channel, the chair is fixed to the "sleeper."

The rails are furnished on each side with semicircular grooves corresponding with those in the chairs. Bolts or keys driven into these grooves secure the rails.

"The rails, both single and double-headed, may have their ex"tremities jointed one into the other by means of cuts made at "right angles, either vertically and laterally, or in the direction of "the height and width, and in the shape and form of what is "called a rabbit or zig-zag joint."

Longitudinal and transverse sleepers are connected "by means "of notches cut at right angles, and the treenails or spikes of "the chairs" pass "through the longitudinal and transverse "sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1857, June 24.—Nº 1768.

SANDERSON, Charles.—"Improvements in the manufacture "of railway bars, girders, and other articles requiring great "strength and stiffness to resist pressure, concussion, or strain."

This invention relates to "certain improved methods of making "these articles *of a combination* of iron and steel, or of steel only,

" and afterwards hardening and tempering the articles for the " purpose of increasing their strength."

In carrying out the invention it is proposed "to make either " solid or hollow bars, and one plan of effecting this object con- " sists in 'converting' a thick bar of iron, and then rolling it into " the desired form, and subsequently hardening and tempering it. " By this means a very strong and durable rail will be produced, " having a hard steely surface, capable of resisting wear to a " greater extent than a common rolled iron rail, and internally the " rail will be composed of tough iron, as the 'conversion' would " not reach the centre of the bar."

" Another mode consists in taking a bloom of iron heated to a " white heat, and adding thereto cast steel in a fluid state. These " blooms of combined metal are then rolled out into a bar of the " required form and dimensions."

In making hollow bars, the bloom must be rolled into a sheet and then turned up and rolled or pressed into the required form.

All the articles made under this invention must be hardened and tempered.

[Printed, 10*d*. Drawing.]

A.D. 1857, July 1.—N° 1831.

NICKLESS, Joseph.—" A new or improved railway chair."

The chair is made of cast iron, and "consists of two parts, one " fixed and the other moveable. The moveable parts rests upon " the bed plate of the fixed part," and between the cheeks of the parts the rail is held. The moveable part is made to bear firmly against the rail and hold it in the following manner:—" A " wrought-iron wedge or cotter is driven between the moveable " part and the two uprights or side wings on the bed plate of the " fixed part, the motion of the said cotter or wedge being in a " horizontal plane. By the action of the said wedge or cotter the " moveable part of the chair is made to bear firmly against the " rail, and hold the said rail securely in its place. The said wedge " or cotter may be fixed either by a key fastened transversely " through its end, or by a nut on its screwed end, or the said end " of the wedge or cotter may be split, and then clenched after it " has been put in its place."

[Printed, 6d. Drawing.]

A.D. 1857, July 3.—N° 1863.

ROYDS, Thomas, ROSCOW, Thomas, and LORD, James.—"Improvements in lifting heavy bodies under certain circum-"stances, such as minerals or other substances from mines to the "surface of the earth, or from one story of an edifice to another, "and in machinery or apparatus to be used for such purposes."

The invention is applicable to the raising of railway waggons from one platform to another, and to other operations of a similar character. The raising is effected by attaching the matter to be moved to a moveable nut, cylinder, or barrel formed with an internal screw, corresponding to an external screw or thread upon a vertical shaft which passes through the screwed nut, cylinder, or barrel. The screwed shaft being put in motion round its axis, while the nut or cylinder is prevented from turning, the latter, together with its load, is compelled to move along the line of the shaft.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1857, July 7.—N° 1878.

BADGE, Richard John.—"Improvements in railway chairs."

The chair is made with elongated arms, and fixed upon a sleeper immediately under the joint or weakest part of the rail, the arms extending some distance each way from the joint or connection of the two rails, but having their bearing on the centre or strongest part of the chair, thereby giving a proper and equal distribution of the metal, and also affording a proper distribution of the other sleepers at regular distances.

The inventor also drives in wedges to prevent the bolts or nuts from turning and becoming loose.

[Printed, 8*d.* Drawings.]

A.D. 1857, July 7.—N° 1891.

HENRY, Michael.—(*A communication from B. A. Soullié and G. Vigneau.*)—"Improvements in railways and wagons used there-"with in loading and discharging coals, stones, ballast, earth, "and other materials."

"To afford means for the passing of railway wagons from one "line of rails to another without turntables, by a short curved "way which may be so constructed as to be shifted bodily, when

" required, by a travelling crab or similar means. The wagon is " mounted either on plain wheels on independent axles, kept on " the curved way by horizontal wheels connected to the wagon by " arms and working against the lateral faces of the rail, or on " wheels of differential diameters, or when its wheels are flanged " as ordinarily, additional loose wheels are added to carry it on " the curve; the rails of the curved way being for such wagons of " higher level than those of the rest of the line."

[Printed, 1*s*. Drawing.]

A.D. 1857, July 13.—N° 1940.

McKAY, Murdoch, and OSMAN, Henry Forfar.—"Improvements in apparatus for securing the points of railway " switches."

The object of this invention is " to ensure the close contact of " the points of railway switches with the fixed rails when so required, previous to and during the passage of trains over them, " so as to prevent the possibility of the carriages being accidentally " turned out of their track; and this is effected by means of an " apparatus composed of a clip or clutch, with space between its " jaws to receive the lower parts of the fixed rail and the switch " point. The clip or clutch is supported on an axle, which turns " on suitable bearing fixed below the rails, and is worked by a hard " lever situated near to the rod lever for adjusting the moveable " rails or switch points, so as to be conveniently within reach of " the pointsman who will work it. The inner faces of the clip or " clutch are inclined to correspond with the tapering end of the " switch point on the one side, and a similar shaped piece of " metal secured to the rail on the other side, for the purpose of " rendering the hold of the clip or clutch firm and secure when " turned on the points. The head of the inner jaw of the clip or " clutch is enlarged to an extent sufficient to act as a wedge " between the near rail and its corresponding switch, when the " switch point on the opposite side is required to be secured to " its neighbouring rail."

[Printed, 6*d*. Drawing.]

A.D. 1857, August 1.—N° 2096

MAW, Edwin.—" Improvements in constructing railway crossings, points, and switches."

"The point rails, the wing rails, and the check rails of crossings, and the stock rails and tongue rails of switches, are made of wrought steel; and in order to give strength and stiffness to crossings, horizontal bars of angle iron are used between the wing rails, the points, and point rails, and such rails and strengthening bars are bolted at intervals. Like horizontal bars are used between the stock and tongue rails of switches to give strength and stiffness thereto, and are fixed to the stock, or to the tongue rails. The tongue rails of switches are also made with ribs on the inside and outside."

[Printed, 6*d.* Drawing.]

A.D. 1857, August 15.—Nº 2176.

HADDAN, John Coope.—(*Provisional protection only.*)—"Improvements in the construction of railways, and of the carriages to be used therewith or thereon."

"This invention has reference more especially to localities and circumstances in which it becomes desirable as far as possible to economise the lateral space or width to be occupied by the intended railways, and is particularly applicable to and intended for the extension of traffic along the general line of streets, roads, or ways."

It is carried out "by constructing and disposing such descriptions of ways in two or more lines lying in general course, direction, or plan, longitudinally one over the other, and also in constructing, disposing, or arranging such combined ways with lifts or inclines for shifting the carriages from one line to the other, or forming a communication between the different levels or altitudes of the higher and lower separate ways of which the combination consists."

[Printed, 4*d.* No Drawings.]

A.D. 1857, August 25.—Nº 2248.

PARRY, Henry.—"Improvements in the construction of rails for railways or tramways."

The invention consists in forming the ends of rails for a few inches either of a solid rectangular shape, so as to lap over each other, or in one end of some of the rails a mortice is formed, and other rails are formed with tenons fitting thereunto; or the ends of the *rails are connected* together after the manner of a "puzzle "joint." The ends of the rails may be securely held together by bolts and nuts. The section of the other part of the rails may be similar to that ordinarily employed.

[Printed, 8*d.* Drawing.]

A.D. 1857, September 4.—N° 2314.

RAMIE, Charles William.—" Improvements in constructing " the permanent ways of railways," consisting—

" Firstly, in a mode of supporting the rails of railways by means " of a hinged or jointed sleeper the sides of which incline upwards, " in a manner similar to that described " in the inventor's patents, " April 4th, and September 29th, 1856; the wings are jointed " together near to their lower extremities, so that a weight pressing upon the rail shall cause the chairs or jaws to grip and hold " the rail firmly between them. These sleepers may be made of " various forms, or constructed so as to form a continuous support " for the rail, or placed transversely thereto, and made sufficiently " long to replace the gauge or tie bars."

" Secondly, in a mode of securing rails in or to their chairs by " clips or jaws resting or abutting on the chairs, so that pressure " upon the rail shall cause the jaws to close and hold the rail " firmly between them. Chairs thus constructed may be used in " connection with wooden or other sleepers, and formed with or " attached to metallic sleepers."

[Printed, 8*d.* Drawing.]

A.D. 1857, September 10.—N° 2358.

FENTON, James, THOMSON, William, the younger, and **SNOWDON, Thomas.**—" Improvements in the permanent way " of railways."

The invention consists " in forming joint and other chairs of a " combination of wrought and cast iron, the latter being cast on " to the former, and the two when combined forming a chair in " one piece or mass, the arrangement being such that the rail " or rails are held in the chair on the same principle as a piece " of iron or other material is held in a vice when being operated " upon by a workman; the bolts and nuts or keys which secure " the rail or rails to the compound chair are thus prevented from " slacking back or becoming loose.

" The cast-iron portion of the compound chair may be cast on " to the wrought-iron portion at or about the centre of its length,

" or at each end of it, or both, and the cast-iron portion may be " increased in dimensions, so as to form the sleeper or bearing " which carries the upper structure of the permanent way on the " ballast."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, September 12.—N° 2376.

EDWARDS, John.—(*Provisional protection only.*)—" Improve" ments in railways to facilitate locomotive engines ascending " inclines."

" For these purposes there are additional or double rails laid on " inclines, between which the flanges of the wheels of the locomo" tive engines enter, the rails fitting the flanges tightly on either " side; or, in place of double or pairs of rails, the rails are made " with inclined sides, and the wheels of the locomotive engines " are made with double flanches at such a distance apart as to fit " tightly on the inclined sides of the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 17.—N° 2413.

GREAVES, Hugh.—" Improvements in constructing the per" manent ways of railways."

The patentee says, " According to the first part of this invention " I make the sleepers, when used for the bridge or foot rail, flat " upon the top to form a seat for the rail. The part of the sleeper " or bearing plate that is not covered by the rail will curve " outwards, the convex side being uppermost, and it will be " strengthened by ribs cast on the upper and under side. In " some cases I form these cast-iron sleepers with corrugations, or " semicircles at right angles to the line of rails. In securing flat" bottomed rails to these sleepers on the inner side, I cast a fillet " or long low jaw, under which the flange of the rail rests, and on " the outer side one or more jaws are cast, between which jaw or " jaws and a fish plate bearing against the rail, I insert a piece of " wood, which is secured to the sleeper by one or more bolts " passing through the sleeper and keeping the fish plate tight up " to the rail. A plate, similar in section to the fish plate, but " not so long, is likewise used for the intermediate sleepers. This " *piece of wood may*, in some cases, both act as a key and a wedge

" and may extend from one sleeper to the other, so as to give " continuity to the line of rail, and prevent unequal depression in " wet places; or it may be continued throughout the length of " the rails and sleepers to give the latter additional strength."

" When these rails sleepers are used with the double-headed " rail, they are more depressed in the centre under the rail, and " one or more jaws are cast on the outside, and on the inside " between the rails, and secured as above. In some cases I cast " the sleepers in two halves, having their junction beneath the " rails, and being formed with vertical webs or ribs, which are " secured to the rail by one or more bolts, and are connected together underneath by bolts or other suitable means. In securing the joints of double-headed rails, I take two of the fishes, " as at present used, and on the outside I use a piece of metal, " which is secured by the two centre bolts to the fish plate, and " the lower part of such piece of metal takes into a notch in the " chair or sleeper, on which it rests, to prevent the rail from " travelling or moving endwise. This piece of metal may have " a flange at an angle to the vertical piece to support the rail " vertically. These fish plates and pieces of metal will not be " fastened to the chair or plate on which they rest, but will " merely rest thereon. When cast metal fish plates are employed " they are secured to the rail by two or more bolts, and on the " centre of each fish a bearing plate is cast, strengthened by " brackets, or the fishes thickened at the base to obtain greater " bearing surface. The bottom of these bearing plates is convex, " taking a seat on the chair, which is concave. In this method," the fish plates keep the rail from the chair.

The invention also comprises an improvement on the Patent granted to the inventor in 1846, and this improvement consists " in giving greater security to the rail for both joint and intermediate sleepers, by casting two brackets or wings to the same, " thereby shortening the distances between the bearings; . . . . " and in casting such brackets or wings, by means of chills, " which are left in the sand when the pattern is withdrawn. In " tying the above sleepers together, a tie bar" is employed, " which in some cases passes through a hole cast in the sleeper, " or is bolted or otherwise secured to a piece of metal cast to and " projecting below the sleeper."

[Printed, 8*d*. Drawing.]

A.D. 1857, September 18.—Nº 2430.

WEBSTER, Thomas.—(*A communication from Charles Gabriel Lemasson.*)—" Improvements in the permanent way of railways," namely :—

First, "an improved construction of railway chair or support " for rails, made of two pieces of angle iron, one side of which " is shaped or formed to fit the section of the rail, and the rail is " held between the two pieces of angle iron by means of a bolt " passing through them. The other side is flat and fixed to the " sleeper."

Secondly, " an improved joint chair or support for the ends of " rails, formed of two pieces of angle iron, and between the angle " iron and the rails two fish plates are placed, and bolts are placed " through angle irons, rails, and fish plates, the other side of the " angle iron being fixed to the sleeper."

Thirdly, " an improved construction of switch. The tongue " rails of the switch are attached firmly to the fixed rails by " means of fish plates, the flexibility of the tongue rails being " sufficient to allow them to bent to the requisite extent, and the " tongue rails are formed in two lengths, which are connected " together by fish plates, so that the thin portion of the tongue " rails which are most exposed to wear can be replaced without " replacing the whole of the rail."

Fourthly, " in forming the two wing rails of crossings in two " parts, so that that portion nearest to the point of the crossing " may be removed without removing the whole of the wing rail, " and this portion of the rail is formed so that when one side is " worn it may be turned round and expose another side to the " wear ; and in order to hold the middle fixed rails and the point " rail in their position, a piece of angle iron " is placed " in the " outside side of the middle fixed rails, and filling pieces are " placed between the middle fixed rails and the point rail, and a " bolt passes through the angle irons, rails, and filling pieces, and " bolts the whole together."

Fifthly, " in connecting the guard and fixed rail of a crossing " together and to the sleeper, by placing a piece of angle iron on " the outside of the fixed and inside of the guard rail, and placing " a filling piece and two fish plates, between the guard and fixed " rails," *and bolting all together.*

[Printed, 10d. Drawing.]

A.D. 1857, September 24.—N° 2469.

JOHNSON, William Beckett.—" Improvements in raising " and lowering trucks, carriages, engines, or other such railway " appendages from one level to another."

" At a convenient altitude above the higher level, a steam " cylinder is fixed, of sufficient length to allow a piston to travel " through a distance equal to one or somewhat greater than that " of the required lift. To the said piston " is connected " the " truck, carriage, &c. to be raised; upon steam, therefore, being " admitted to the cylinder it will be drawn upward. Upon the " required level being attained a projecting part " arrives " in " contact with apparatus cutting off the steam so as to arrest the " motion of the piston. For lowering the apparatus the steam " is allowed gradually to escape through a cock or other suitable " apparatus."

" In employing pneumatic power," air is forced " into a receiver, " from which it is admitted, when required, into a cylinder. In " order to check an undue impetus of the body being raised or " lowered, buffers of india rubber " are used " above and below " and this is applicable to other machinery employed for a similar " purpose."

[Printed, 10*d.* Drawing.]

A.D. 1857, September 30.—N° 2513.

THOMPSON, Edwin, and NICHOLSON, William Joseph. —" An improvement in railway switches."

The invention consists—

Firstly, " in so constructing railway switches as that the tongue " rails lift clear of the chairs, instead of sliding, as commonly " practised."

Thus " the necessity for oiling the chairs is dispensed with, and " the chance of sticking half open entirely obviated."

And secondly, in the addition of check rails or guards to such moveable points.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1857, October 15.—N° 2644.

WALKER, Charles. —(*Provisional protection only.*) — " Im- " *provements in* atmospheric railways."

This relates to "the arrangement and working of atmospheric "railways, with a solid tractive pipe in place of the usual open "valve pipe. It is intended for use more especially for branch "lines, and for colliery and general subterranean purposes. The "working piston traversing the pipe is connected to the two ends "of a traction chain or rope which pass out at the two ends of "pipe, being supported externally along the entire exterior of the "pipe, from end to end in carrying pulleys. In this way, as the "air is pumped out from one end of the tube, the attached chain "draws the train in the contrary direction."

[Printed, 4*d.* No Drawings.]

A.D. 1857, October 17.—N° 2656.

BADGE, Richard John.—"An improved mode or method of "securing railway chairs to the sleepers."

"Instead of the usual trenail or spikes for securing them to the "sleepers, fasteners" are used, "composed of two or more pieces "similar to a mason's lewis."

These improved trenails or fasteners have a compound slot in the direction of their length, "into which a metal key of parallel "thickness is firmly driven after the wooden trenail or other side "pieces have been driven into their places. The key or centre "piece is furnished with a head, by which it can be drawn out "when required."

[Printed, 6*d.* Drawing.]

A.D. 1857, October 22.—N° 2691.

BETHELL, John.—"Improvements in machinery or apparatus "for trenching, cutting, digging, and cultivating land."

The invention has reference to locomotives in which rotary excavators are employed and worked by the same power which effects the locomotion, and consists in constructing such apparatus in combination with a self-laying railway.

This railway is constructed of a "series of separate slippers, "shoes, or pieces suitably disposed around the circumference of "the wheels."

[Printed, 10*d.* Drawing.]

A.D. 1857, October 23.—N° 2701.

PARKER, Benjamin.—(*Provisional protection only.*)—"*Im-* "*provements in the permanent way of railways.*"

This "relates to sleepers and chairs, and the mode of connect-" ing or fitting them together, and laying them down; and " consists in forming hollow cast-iron sleepers of a parallelogram " or other suitable form in plan, with downward bevilled flanges " forming the sides and ends; the surfaces of such chair being " cored with holes to reduce the weight thereof, and enable the " ballast packing to be rammed up and consolidated, or otherwise " treated for the purpose of adjusting the position of the sleeper " upon the road."

"On the upper surface or face of the sleeper is formed a recess, " by means of fillets surrounding it, for the purpose of containing " an elastic packing bed-piece or spring."

"The chair is formed with a flat bottom, for the purpose of " resting upon the elastic bed piece or spring, the bearing being " increased considerably longitudinally as compared with the " ordinary chair for wood sleepers, so that the bearing surface is " suitably enlarged by increasing the length of the chair in the " direction of the line of road."

The inventor also describes a method of securing the chair and sleeper and tie bar together in one fastening.

[Printed, 4*d.* No Drawings.]

A.D. 1857, October 28.—N° 2725.

IRLAM, WILLIAM.—(*Provisional protection only.*)—" Improve-" ments in wrought-iron railway chairs, sleepers, and crossings."

The invention consists in making railway chairs in two parts, secured together by a bolt passing through them and through the rail, and then secured to a sleeper of the usual construction, or to a wrought-iron plate, either hollow or flat. " The wrought iron " for the chairs is rolled to the required section to fit between the " shoulders of double-headed rails, and to fit around or partly " around the lower shoulder. The rails are kept to guage by tie " bars, or by making some of the sleepers of sufficient length, " and placed transversely, so as to have a chair near each end."

" When the chairs are of rolled iron, the bars must be cut to " the required lengths, but instead of being rolled the chairs may " be stamped or otherwise forged to the shape required."

" The improvements in railway crossings consist in making the " *point with the two* side rails and the bed plate of one solid piece " *of wrought iron* The crossing may be made double, that is to

" say, with grooves at each side, so that when the top is worn or
" injured, the lower side can be brought uppermost."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 28.—Nº 2735.

CLARK, WILLIAM.—(*A communication.*)—" An improvement in
" rails for railways."

" The invention has for its object the construction of rails in
" such a manner as to obtain the necessary strength with a less
" weight of metal than is required in any rails heretofore used."
The I or H rail and inverted T rail " both contain much metal
" in the head that is unnecessary and useless, and that is dispensed
" with in this invention, which consists in forming an inverted
" T rail with an aperture or hollow space extending lengthwise
" through the thick upper portion of the rail."

The patentee claims for this rail facility of splicing by plugging
or dowelling at the joints.

[Printed, 6*d*. Drawing.]

A.D. 1857, November 4.—Nº 2800.

MURPHY, JAMES.—(*Provisional protection only.*)—" Improve-
" ments in the permanent way of railways."

It is proposed " to make a 'fish plate' by first taking a flat
" iron plate, on the centre of which the ends of two rails will rest
" longitudinally, and having rolled out or cast a pair of plates in
" such wise that one may be placed on each side of the rail cover-
" ing the first plate, and running up the rail till they arrive under
" the top thereof, and fitting exactly the form or shape of the
" rail, and serving to support the same, the joint of the rails being
" in the centre of the first plate, and now supported by the plates,
" the whole combination is to be secured or fastened together."
This is effected by " passing several screw bolts through the lower
" and one of the upper plates, and securing the same by nuts, to
" allow the removal of the rail when required. The plate on the
" other side will be rivetted only."

The upper portions of the supporting plates are secured to the
rails by bolts."

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 6.—Nº 2818.

ANDERTON, WILLIAM.—(*Provisional protection only.*)—" New
" *railway chairs.*"

"These chairs are of iron metal cast in halves longitudinally,
" There is a sufficient thickness of metal in the chair under the
" rail to admit of the two halves being bolted together underneath
" the rail after the rail has been placed in the chair. This is
" effected by a wrought-iron bolt or bolts through the chair, thus
" obviating the bolting through the rails."

"The whole of the lower head and neck of the rails are covered
" by the chair, which keeps the rail perfectly steady and tight."

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 6.—N° 2819.

BESSEMER, Henry.—" Improvements in the manufacture of
" malleable iron and steel, and also in the manufacture of rail-
" way bars and other bars, plates, and rods from iron or steel so
" manufactured."

The patentee says, " When malleable iron or steel is obtained
" by the decarbonization of crude pig, or refined iron, by the
" passing of air or steam through the molten metal, or by the
" cementation of the iron with oxides and other matters it
" frequently happens that the ingots are found to contain cells
" or cavities and in consequence of the peculiar crystallization of
" the metal, or from the combination of oxygen therewith, or
" from other causes, such ingots are more or less 'hot short,' and
" are liable to crack along the edges when subjected to the
" ordinary process of rolling or hammering."

"The object of my invention is, to lessen or entirely remove
" these defects. For this purpose I construct a circular mould,
" which I mount on a vertical axis in a strong iron frame, and
" which is made by suitable gearing to revolve " rapidly. " In
" the central part of the mould, I fit a disc, around which a cavity
" is formed somewhat of the shape required to form the rim of a
" fly wheel, the upper part of the mould being open in the central
" part, and covered at the edges. When molten malleable iron
" or steel is to be cast according to my present invention I run
" or pour such metal in a stream down upon the revolving disc
" of fire-clay or other material from such a height as will cause
" the fluid metal to divide itself into numerous globules, and
" thus favour the extrication of carbonic oxide or other gaseous
" matter from the molten metal, and which globules will be again
" collected at the periphery of the mould, and be carried round
" with it and be thereby subjected to considerable pressure by

" reason of the centrifugal force generated by its rapid rotation
" and thus be formed into a ring or hoop, having a square,
" octagonal, or other sectional form, depending on the internal
" form of the mould, and of a dense and solid texture, owing to
" the peculiar arrangement of the particles of molten metal
" before or during the period of solidification."

In completing the rails these annular ingots may be rolled or
" they may be cut and then rolled in the ordinary manner.

[Printed, 10*d*. Drawing.]

A.D. 1857, November 7.—N° 2821.

BAINES, Hugh.—" Certain improvements in machinery or
" apparatus for the prevention of accidents, applicable to hoisting
" and other lifting machines."

This invention partly " relates to hoists employed upon rail-
" ways for raising and lowering wagons, &c., and consists in the
" application of india-rubber or other springs in conjunction
" with levers, connecting rods, and catches placed underneath
" the table or platform, and so constructed and arranged that
" when any one or more of the four suspending chains of the
" hoist breaks or becomes disconnected, all the catches shall
" immediately be forced outwards, and catch into racks or some
" other similar contrivances at the sides of the hoist, so that the
" descent of the box, chamber, or platform shall be arrested at
" its four sides simultaneously in the event of any such accident
" as above mentioned."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, November 18.—N° 2888.

BELL, William Heward.—" Improvements in the permanent
" way of railways."

" In forming a continuous rail by making the rail in three
" separate pieces, breaking joint with each other," and only one of these pieces requiring to be replaced as the surface becomes worn, instead of renewing the whole of the rail. Chairs also are dispensed with, and in some cases nearly flat plates are employed instead.

" The principle elementary feature of the invention consists of
" a T-shaped rail, forming the head or working surface, sup-
" *ported by two* rectangular or L-shaped rails or plates, placed

" one on each side of the lower or vertical flange of the **T**-shaped " rail."

[Printed, 10*d*. Drawing.]

A.D. 1857, November 19.—N° 2900.

MIRIO, Jean Baptiste.—(*A communication from M. Pluchet.*)—(*Provisional protection only.*)—" Improvements in the permanent " way of railways."

These improvements consist " in connecting the rails by two " short plates or fishes, secured to the rails by bolts and nuts, " or otherwise, and placing this joint in a notch in a sleeper, " and applying a block of suitable material on each side of the " rails; these blocks are bevilled at one end, which enters a " notch in the sleeper, while the other end is fitted to the side " of the plate or fish. The blocks are fixed to the sleepers by " screws passing through small plates or saddles placed on the " blocks. The heads of the bolts which secure the plates or " fishes may lie on each side of and close to one of the blocks, " so as to prevent the rails from moving endways."

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 19.—N° 2905.

CLAY, William.—" Improvements in the points, switches, and " crossings of the permanent way of railways."

This invention consists " in manufacturing such parts of the " permanent way of railways of steel bars rolled into the required " form," or of bars made up of iron and steel, the latter forming the wearing surfaces.

The patentee does not confine himself to any particular form of rolling apparatus.

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 9.—N° 3046.

SMITH, Joseph.—" Certain improvements in securing rails in " their respective chairs for railroad permanent ways."

The patentee says: " The object is the better adapting of the " railway chairs now commonly used by making the keys by " which the rail is held (in the chair), of iron instead of wood, " as great expansion and contraction takes place with the use of " wood. This defect is entirely obviated by the use of iron keys,

" in tightening which I prefer, instead of striking them, to con-
" struct them with a fixed flange on one end, clipping the side of
" the chair, and to apply a flange on the other end of the key, to
" be secured by a screw bolt passing lengthway through the key,
" This mode, either on curves or straight lines will be found
" thoroughly efficient, as it is impossible, from the projecting
" flanges clipping that side of the chair to which such key is
" applied" for the latter to shake out."

[Printed, 6*d*. Drawing.]

A.D. 1857, December 31.—N° 3196.

BARLOW, Peter William.—(*Letters Patent void for want of Final Specification.*)—" Improvements in the permanent way of " railways."

This consists in "an improved mode of constructing chairs " where the rail is seated altogether in wood, and of securing the " rails in such chairs."

" The novelty consists in making the cheeks of such chairs cast " in one piece (whether in combination with cast-iron sleepers or " used on ordinary timber sleepers), parallel or slightly inclined to " the top of the rail, and in the use of two wedges or keys, one on " each side of the rail."

" The advantage is the protection of the keys from the weather, " rendering them more durable and less likely to become loose, " and the means of adjusting the guage thus given are particularly " advantageous when transverse iron sleepers are used. When " used with longitudinal iron sleepers, or in ordinary chairs, one " key only is preferable, the rail being supported on the opposite " side by a wooden cushion, or other elastic material placed in a " recess of the chair."

[Printed, 4*d*. No Drawings.]

1858.

A.D. 1858, January 19.—N° 87.

BRUFF, Peter Schuyler.—(*Provisional protection only.*)— " Improvements in the construction of submerged tunnels."

"A peculiar construction and arrangement of submarine " tunnels, and a mode of laying the same, and consists in the

" application and use to and in the construction of tunnels of this " description of metal tubes made in sections or lengths of suitable " dimensions and shape, such tubes resting upon or being sunk into " the bottom of rivers or arms of the sea required to be crossed, and " are adapted for roads, railways, and other communications which " may require to be established through or under the same. The " tubes may be constructed of one, two, or more thicknesses of " plating with ribs, stringers, and kelsons, of angle iron or other " form, the whole being securely bolted, screwed, and rivetted " together."

The lengths are temporarily closed at the ends by plates and sunk into position, after which they are secured together and lined with masonry or concrete.

[Printed, 4*d.* No Drawings.]

A.D. 1858, January 20.—N° 98.

DAVAGE, Charles, and DAVAGE, Thomas.—(*Provisional protection only.*)—" Improvements in railway crossings."

This invention consists in connecting the point rails for crossings with the tongue or point piece, which is to be made of cast or wrought iron or cast steel, by means of a dovetail joint.

A fantail prolongation is fitted to receive the point rails, which when in position are wedged between the wing rails, and secured by a bolt.

[Printed, 4*d.* Drawing.]

A.D. 1858, January 25.—N° 135.

DERING, George Edward.—" Improvements in the permanent " way of railways."

The object of the invention is " to obtain continuous, even, and " durable rails, by connecting together the successive separate " rails, firstly, by soldering with any suitable metal or alloy, or " secondly, by the processes known as autogenous soldering or " burning together, a sufficient degree of heat being applied " to cause union by the partial or complete fusion of the metal " of the rails; or, thirdly, by welding." The latter operation is effected when the rails are in their proper position on the permanent way, an excavation being made, if necessary, for the forge, furnace, or other source of heat, and the successive lengths of rail being laid " down in their intended permanent

" positions or nearly so, and forced by wedging or by blows of a " hammer or otherwise, up to the length already laid down and " united, and by preference into very close longitudinal contact " therewith."

[Printed, 4*d.* No Drawings.]

A.D. 1858, January 30.—N° 176.

ASHCROFT, PETER.—" An improved mode of supporting the " rails of railways in their chairs."

The object of the invention is " to provide a means for supporting double-headed rails in their chairs, so that their under " wearing surface shall not become injured by contact with the " seats of the chairs. For this purpose the rails " are suspended " in rigid chairs of a peculiar construction by the use of filling or " supporting pieces, which may be of iron or wood, placed one on " either side of the rail, and forming therewith a compound " wedge."

By ribbing the jaws of the chair and forming the wedges, when of cast iron, to conform to these ribbed surfaces, the wedges may be prevented moving endways.

[Printed, 6*d.* Drawing.]

A.D. 1858, February 3.—N° 196.

ARMANI, ANTHONY NICHOLAS.—(*Provisional protection only.*) —" Improvements in rail or tramways for streets and ordinary " roads."

The invention consists " in casting rails with a longitudinal " groove in the upper face thereof, in chilling their upper surface, " and in forming them solid at top with sides carried down " and terminating at bottom in feet or supports extending outwards there from. The sides are cast in such manner as to " leave a space between them, which is filled up with " suitable material, and it is preferred to cast the sides with apertures therein. " The ends of each rail may be cast with eyes, which " project outwards from the sides, those on the outside to receive " bolts for securing the rails together longitudinally, and those " on the inside to receive a bolt or other agent for connecting a " tie rod or bar for maintaining the guage between the rails."

[Printed, 4*d.* *No Drawings.*]

A.D. 1858, March 6.—N° 447.

MOATE, Charles Robert.—"Improvements in the permanent way of railways."

"The invention has reference to that description of permanent "way in which longitudinal bridge or saddle metal rails are laid "directly upon the ballast, and consists in filling up or partly "filling up" with wood or concrete, "the hollow space or under "side of such rails, or in covering over or partly covering" with metal plates "over such under side or surface so as to facilate the "packing of the ballast when being laid, repaired, or packed "up. And in the application of short tie rods or plates to the "under side of the said rails, and across the hollow or open "space, so as to prevent the rails from opening or spreading "or becoming flattened, or so as to hold the substance or material employed for filling up the hollow space."

[Printed, 10*d*. Drawings.]

A.D. 1858, March 6.—N° 457.

REED, William.—(*Provisional protection only.*)—"Improvements in the permanent way of railways."

"An improved means of connecting the ends of the rails, and "also of holding them in joint chairs. For these purposes fish-"plates are employed, formed to fit the section of and pass under "the rails, the fish-plates and rails being supported by a joint-"chair . . . . by means of bolts passing through the rails, the "fish-plates and one jaw of the chair, and also by a wooden "wedge driven between the fish-plate and the other jaw of the "chair. The rails are also fixed to the fish-plates by means of "bolts exterior of the joint chair passing through the rails and "the fish-plates. The bolts are retained by screw nuts."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 20.—N° 578.

PARSONS, Perceval Moses, and DEMPSEY, William. —(*Provisional protection only.*)—"Improvements in the construction, of switches and crossings for railways."

" In constructing switches from flat bottom rails," the patentees connect "the heel of the tongue to the ordinary rails by "means of fishing plates," and they taper the "point off, and "house it under the main rail. In the construction of crossings "from similar rails," they apply "rails, bars, or plates between "the wing rails and the wing and point rails for the flanges of "the wheels to run upon. In the construction of crossings "applicable to other forms of rails as well as the above," they construct "the points and wing rails of rolled or forged steel, or "steel iron, and of such a form that the flanges of the wheels can "run upon them." And they construct "crossings by cutting "bars of suitable sections in two diagonally, reversing the two "parts, and uniting them firmly together by bolts, rivets, or "otherwise; the bars may be of such sections that when thus "treated they will form either the point rail or the point and "wing rails together, and so that the flanges of the wheels may "run upon them or not."

"To connect the wing and point rails to the ordinary rails," "they employ three fishing-plates, one double plate in between the "two lines of rails across the two joints against the adjoining "sides of the rails, and two single plates against the other "side."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 25.—N° 625.

CLARK, William Stettinius.—(*A communication from Sidney A. Beers.*)—Improvements in the construction of rail-"ways."

"An iron foundation rail is used, of the form of a series of "upright arches, resting on stone or other substantial foundations, "and tied together laterally by upright iron ties, and with a "wrought-iron coping rail fitting into the top of the said foun-"dation rail, and extending downwards on each side thereof, "terminating at the bottom in flanges to receive clamps or "hooks, which are held in place and tightened upon the said "flanges, thereby confining the said coping rail to the foundation "rail by means of key wedges or their equivalents; the said "coping rail breaking joints with the foundation rail so as to "form a continuous track, and having lock joints of such form "and construction that the adjacent ends of two lengths of rail "cannot rise independently of each other, and that the breaks in "the face of the track at the junction of the several lengths of "rail are oblique and not directly across the face of the rail. To "*overcome the too great* solidity of the permanent way, a strip "of gutta percha, lead, wood, or other elastic substance, rolled "in the form of a segment of a circle, may be placed between the "top of the foundation rail and the coping rail, where it is con- "fined as it were in a box formed in the interior of the coping "rail, thus overcoming the too great solidity which would result "in a track composed entirely of iron with stone foundations."

[Printed, 6*d.* Drawing.]

A.D. 1858, March 30.—N° 671.

DURAND, Jean Claude.—"Improvements in the manufacture "of iron."

The patentee says, "Heretofore, in the manufacture of iron for "rails, girders, beams, axles, and other articles, but little or no "regard has been shown to the relative positions occupied in the "mass of iron by the several elements of the pile from which the "said articles have been manufactured. Now, my invention "consists in so combining such elements that each of them con- "sidered by itself shall occupy in the finished article the position "most favourable to the exercise of its maximum strength when "subject to the forces which it is destined to bear. By this "means their aggregate strengths, that is, the strength of the "article which they compose, will be greater than under any other "circumstances. Thus, for example, the component portions or "elements of a horizontal beam or bar of iron intended to sus- "tain a downward pressure will be placed side by side, with their "edges upward and downward."

The elements of the pile are to be formed with sections suited to the strains which are to be exerted on the finished article.

[Printed, 6*d.* Drawing.]

A.D. 1858, April 14.—N° 803.

HOLMES, William Cartwright, and HOLLINSHEAD, William. — "Improvements in the manufacture of metal "castings."

"Firstly, in the use of ordinary or superheated steam, hot air, "or hot water, introduced or passed through chambers or pas- "sages formed in metal moulds for maintaining the said moulds "at, or as near as possible, an equal temperature during the "process of casting.

"*Secondly,* in the employment of superheated steam or hot air "*for drying* the cores of pipes by passing the same through the

" core barrel, and for drying other cores and dry sand moulds by " placing them in a suitable vessel having a 'jacketing' or chambers for passing the steam through."

This method is described as applicable to the moulding of railway chairs.

[Printed, 1s. 6d. Drawings.]

A.D. 1858, April 15.—N° 821.

HARRIS, John, and SUMMERSON, Thomas.—"An improvement in railway chairs."

The invention "consists in forming recesses on the under sides " of chairs in such manner as to receive hollow pieces of wood, " through which and through the upper surfaces of the chairs " the pins or bolts are driven; so that the wood forms bushings " around the pins or bolts, which are driven through to hold " down the chairs. The recesses for holding the wood are of " larger diameter than the holes through the upper surfaces of " the chairs, so that the wood cannot be drawn through from the " under surfaces of the chairs."

[Printed, 10d. Drawing.]

A.D. 1858, April 19.—N° 849.

WESTHEAD, Marcus Brown, and BAINES, Hugh.—(*Provisional protection only.*)—"Certain improvements in machinery " or apparatus for the prevention of accidents, applicable to " hoisting and other lifting machines employed in connection " with railways or other places where heavy bodies require to be " moved from one level to another."

"These arrangements of mechanism consist of levers which by " means of weights or springs are made to assume a position and " act as scotches to the movement of a waggon, truck, or other " carriage on to the platform, and to prevent such carriage from " moving off the platform during its ascent or descent, the position of these levers being changed by mechanism in connection " with the platform of the hoist, so as so allow a free passage of " the carriage when the platform of the hoist is in its correct " position."

The invention further consists "in arrangements of mechanism to disconnect the motive power from the machinery which " regulates the ascent and descent of the hoist, in case one or " more of the ropes or chains by which the platform is suspended

" should break, and also immediately to apply the brake to pre-
" vent its descent."

[Printed, 4*d*. No Drawings.]

A.D. 1858, April 21.—N° 879.

PARKER, Benjamin.—" Improvements in the permanent way
" of railways."

This " relates to sleepers and chairs, and the mode of connecting
" or fitting them together, and laying them down ;" " and consists
" in forming hollow cast-iron sleepers of a parallelogram or other
" suitable form in plan, with downward bevilled flanges forming the
" sides and ends, the surfaces of such chair being cored with holes
" to reduce the weight thereof, and enable the ballast packing to
" be rammed up and consolidated, or otherwise treated for the
" purpose of adjusting the position of the sleeper upon the road."

" On the upper surface or face of the sleeper is formed a recess,
" by means of fillets surrounding it, for the purpose of containing
" an elastic packing bed-piece or spring."

" The chair is formed with a flat bottom for the purpose of
" resting upon an elastic bed-piece or spring, the bearing being
" increased considerably longitudinally as compared with the
" ordinary chair for wood sleepers, so that the bearing surface is
" suitably enlarged by increasing the length of the chair in the
" direction of the line of road." The inventor also describes a method of securing the chair and sleeper and tie bar together in one fastening.

He further describes an elastic packing composed of india rubber, flax, chalk, coal tar, and sulphur.

[Printed, 8*d*. Drawing.]

A.D. 1858, April 28.—N° 943.

MARTIN, Brooke, and LIGHT, Charles Julian.—" Im-
" provements in railway turntables."

The invention consists in combining a solid bearing for turntables when not in action, with the use of rollers upon which to move when turning, " these rollers being at such a level that
" when the table is on its solid bearing it is in no way supported
" by them."

" *The table is* prepared for use by raising it off its dead bearings
" *at four or* more points on its circumference by means of

" counterbalance weights, or otherwise, and it may then be " lowered on to the rollers by means of counterbalance weights " or otherwise, and it may then be lowered on to the rollers by " means of pillow blocks, or the rollers themselves may be so " connected with the counterbalance levers as to rise with the " table and support it while turning."

The table may also be kept just free from its bearings by weights, which would allow it to be brought down to a dead bearing by the weight of a passing engine.

[Printed, 1s. 2d. Drawings.]

A.D. 1858, April 28.—N° 946.

CLARK, William.—(*A communication from Emile Poiret.*)— " Improvements in railway crossings."

In this crossing two moveable rails, connected by bolts, and having one of their extremities joined in the " switch heel chair," are substituted for the fixed rail and switch of ordinary crossings, " and serve to guide the carriages on to either of the two lines " placed in communication by those parts." In addition there is a flat bar of iron, raised above the moveable rails, and fixed by its extremities to the ends of ordinary rails which are also permanently fixed. Now when a carriage enters at the heel of the switches, the flanges of the wheels interpose between the fixed rail and the moveable rail and compel the latter to communicate with the line. When the carriage enters at the point and it happens that neither of the moveable rails is in communication, the flanges will ascend on to the inside rails, but the fixed rail being at a higher elevation will not cease to direct the carriage, and in rolling one of the flanges will fall between the fixed rail and the inside moveable rail and thus restore the switch to its proper state.

[Printed, 10d. Drawings.]

A.D. 1858, May 1.—N° 978.

TALABOT, Leon.—" Improvements in rolling railway and other " bars."

" In rolling bars, when 'three high rolls' are employed, the " middle roll is formed with alternate grooves and projections, " the projections on the middle roll enter into grooves in the " lowest row, and projections on the highest roll enter into grooves " *in the middle roll*, and the metal in rolling is passed alternately

" between the middle and upper rolls, and the middle and lower
" rolls. Thus the spaces between the rolls are always enclosed
" by grooves in the lower and projections on the upper of the two
" rolls, between which each of such spaces is formed, except when
" passing a railway bar for the last time through the rolls, when
" in order to round off the top of the rail the space between the
" rolls is enclosed by grooves in each roll. The distances between
" the rolls in a vertical direction are adjusted by means of wedges
" acted on by screws, the wedges being placed between the bearings
" of the rolls. The bar coming from the lowest grooves is
" raised by means of a lever, which is suspended from the axis of
" a wheel, which runs on a rail above the rolls. The rail is connected
" with levers, so that it may be raised and lowered. By
" these means the bar may readily be moved sideways, in addition
" to being raised and lowered."

"The other part consists in rolling round bars of iron."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1858, May 7.—N° 1030.

BROWN, Thomas, and BROWN, David.—" New or improved
" machinery for filing or smoothing the ends of fish-plates, rails,
" wrought-iron railway chairs, and other articles made by sawing
" bars transversely."

This invention consists in the removal of the fringe or burr left on the ends of articles made by sawing bars transversely, by means of rotating rolls or cutters.

[Printed, 10*d*. Drawings.]

A.D. 1858, May 12.—N° 1072.

JACKSON, Joseph Gratian.—(*Provisional protection only.*)—
" A method of carrying roads over (or through) land covered
" with water."

There is placed " upon the surface of the water, ... a water-
" tight tube, open at the ends, and of a sufficient length and
" diameter. . . . . In some cases the tube may be constructed
" of wood, but iron will usually be found the cheapest and best
" material for the construction of it."

"The roadway is laid down in the interior of the tube, which
" may be enclosed in another similar tube or tubes for great
" *security.*"

"When completed the tube or tubes are to be sunk in the "water on to the solid ground, which must be prepared, by "dredging or otherwise, so as to form a solid and secure bed to "receive the tubes. The tubes may be wholly or partially im-"bedded in the ground, if desired." The tubes may also be suspended from pontoons.

[Printed, 4*d.* No Drawings.]

A.D. 1858, May 19.—N° 1111.

BROWN, Jeremiah.—"Improvements in the manufacture of "iron, and in rolling iron and steel, and in machinery to be "employed therein."

The improvements claimed under this invention have reference to "puddling and compressing" iron by the use of "mechanical "puddlers and percussive instruments," to the transfer of puddled balls from furnace to furnace or from furnace to rolls or elsewhere, to machinery for rolling "puddled and other bars or "rods or rails from the puddled ball, to machinery for scraping "the scale from iron, to forming large piles of iron, to making "small billets, to rolling girders, to rolling iron for the manu-"facture of screw nuts, and finally to rolling trough-like bars of "iron or steel for coating or casing other bars."

[Printed, 2*s.* 2*d.* Drawings.]

A.D. 1858, May 19.—N° 1116.

MILLER, George Mackey.—(*Provisional protection only.*)—"Improvements in the joints of bridge rails for railways."

"For this purpose" "joint chairs are employed. These chairs "are made with two jaws which project over the flanges of the "rails, and with a central ridge which enters the hollow under "the rails; this ridge prevents the ends of the rails from shifting "laterally, and metal keys driven in between the flanges and the "jaws of the chair prevent them from moving vertically. Chairs "of this construction may be used advantageously either with "transverse or longitudinal sleepers."

[Printed, 4*d.* No Drawings.]

A.D. 1858, May 21.—N° 1130.

BRANT, John Charles.—"Improvements in the permanent "way of railways."

It is proposed to make railway sleepers "both imperishable and "indestructible." "They may be formed of potters' clay, Stourbridge clay, refuse of glass works," or other similar materials, and "may be moulded to any necessary form or size while the "materials are in a plastic or malleable condition, and when "formed they undergo the process of kiln-drying or burning, "according to the nature of the materials used. The sleeper "may be formed with or without the chair attached, which chair "may be made of the same material and the whole width of the "sleeper or less. Bolt holes may also be formed in these sleepers" and wooden trenails used; or the sleeper may be formed with a groove to admit the rails, under which is placed a cork packing.

"When any of the usual kind of iron chairs are used . . . "the place for fixing the chair can be moulded on the sleeper."

One improved rail is composed of "wood and iron, the wood "forming the interior and being slightly raised." Another rail "is of metal only, and is a single headed rail of a **V** pattern "fitting into groved shaped intermediate sleepers."

This is an improvement on the inventor's former patent of 1855, N° 1344, in the addition of a new sleeper, and of improved forms of rails.

[Printed, 4*d*. No Drawings.]

A.D. 1858, May 28.—N° 1200.

DUNN, Thomas, and IRLAM, William.—"Improvements "in machinery for altering the position of locomotive engines and "carriages on railways."

The invention consists in "machinery for turning ordinary "turntables by power, and consists in casting a flange at or near "the lower edge of the ring of the turntable top, by which "greater strength is obtained and a saving of labour is effected."

"In making turntables of large dimensions with bowstring "sides or with tubular stays, to avoid the necessity of deep "pits."

"In making the ends of the traverser's rails of iron or steel "plates forming spring points, which points are depressed by the "wheels of the carriage that is being pushed on to or off the "traverser."

"In making the ends of the traverser rails to swivel on fixed "*studs, and in* such wise that the inner ends thereof overbalance

" the points, thereby raising the points clear of the rails while " the traverser is being moved, but when an engine or carriage is " being placed on or off the traverser the wheels depress the " points of the traverser until they bear on the rails of the per- " manent way, thereby forming the inclines for the wheels of the " carriage."

"In placing the cross tram rails for the traverser on different " levels, the outer rails are level with the permanent rails, and the " inner rail or rails are raised sufficiently to act as guides;" and " in making a portion or portions of the cross tram rails for the " traverser capable of being raised or lowered" by suitable machinery, "so that one end of the traverser may rest on the " main line, or that the whole traverser may rest on the main line " when the engine or carriage is rolled on to or off the traverser, " and that the whole traverser may be raised when it has to be " moved laterally."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1858, June 1.—N° 1220.

VASSEROT, Charles Frédéric.—(*A communication from Antoine Gaud.*)—(*Provisional protection only.*)—" A kind of " tramway to facilitate the locomotion of bedsteads."

"To effect this, under the casters a sheet-iron band of suitable " width" is fixed, " having a small projecting flange on each side. " The two rails are nailed or screwed to the floor. By means of " this arrangement the bedstead can be moved by the slightest " force."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 4.—N° 1258.

DICKSON, John Farmerley.—" Improvements in the per- " manent way of railways."

They relate to permanent ways in which wrought iron is principally used, and in which the bearing surfaces are laid " longitudinally and continuously in the direction of the road It is proposed " to form the wings or sleepers out of one piece of " plate iron, about one-third of an inch in thickness, in which is " formed a groove running its entire length, into which " is placed " the vertical limb of a single-headed rail of a new and improved " form, which arrangement prevents any stress on the screw bolts " attaching the wings to the rails, and at the same time requires a

" less number of fastenings. A new and improved form of cast " or wrought iron sleeper" is used, "either detached or continuous" to be used in connection with the rails in ordinary use. " Notches or teeth" are also formed "in the ends of bolts or " screws employed in the permanent way," and catches are placed on the nuts or other parts "to which the screws are fitted, so that " the catch may fit in the notch and prevent the bolt or screw " becoming loose."

[Printed, 1*s*. Drawings.]

A.D. 1858, June 4.—N° 1259.

MERIGHI, VITTORIO.—(*Provisional protection only.*)—"Means " for preventing dust on railroads."

The invention consists "in providing, in case of great drought, " each train, or a suitable number of them, with a special water " provision, which, by suitable mechanical arrangements is to be " distributed over the track, so as to keep the earth of the line " sufficiently moistened for preventing dust. For this purpose " the capacity of the water reservoir of the tender may be sufficiently increased, or a special tender for carrying the water may " be made use of; and in order further to make the water subservient for cooling the air, suitable frames or other arrangements, provided with linen, wire cloth, felt, or other pervious " open materials, may be applied in suitable positions to the train " so as to allow the water to run down along, and the air of " passing through them, thereby causing an evaporation of the " water and a consequent cooling of the air. If necessary, the " water may be lifted at the required height by a small force " pump, and, if required, carried by means of a hose or other " suitable pipes to any part of the train, and there caused to run " down along the said pervious bodies and spread over the line; " suitable water reservoirs are to be situated along the line for " providing the trains with the required quantities of water."

"Instead of making use of water only, the same may have " mixed with it a suitable quantity of chloride of calcium, or any " salt having a great attraction of water."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 21.—N° 1392.

ANDERSON, Sir JAMES CALEB.—"Improvements in loco-" *motion*, parts of which are applicable for other purposes."

The patentee prepares a road of stone, coated with stone, or wood, or brick pavement, or with timber covered with iron plates. On this is placed a T-rail against which work horizontal wheels " attached to the engine or carriage. On steep hills a similar line may be prepared parallel with the other, and on this a small loaded carriage may run connected with the ascending train by a rope passing round a pulley at the top of the incline. Thus the loaded carriage will overcome the gravity of the ascending train. The inventor also proposes to facilitate locomotion by causing the wheels of a carriage to run inside the peripheries of larger wheels, which peripheries may be made polygonal if preferred. Again, to facilitate the ascent of inclines; a timber tramway is to be laid at a level higher than that of the ordinary rails. Smaller wheels are placed inside the driving wheels of the locomotive, and these coming up to the timber road, will mount upon it and run thereon with increased adhesion.

[Printed, 6*d*. No Drawings.]

A.D. 1858, July 9.—N° 1548.

SANG, Frederick, and RAMMELL, Thomas Webster.— " Improvements in the means of conveying letters and parcels " from one place to another."

The letters or parcels are placed in carriages to travel within tubes, and will be propelled in the desired direction by atmospheric pressure.

The invention also consists in the division of a main or through line of communication into "separate sections of convenient " lengths, with stations " at their points of junction, " and " arrangements for the interchange of the carriages, so that they " may be passed from one section to another, whereby a con- " tinuous and simultaneous up-and-down communication may be " maintained throughout the whole line, and also the putting " in and taking out of letters or parcels be effected at each station " with every train. Branch or cross lines, also divided into sec- " tions, if requisite, may be made to communicate with a main " line at any station."

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 20.—N° 1631.

SCHMITT, Jean.—(*Provisional protection only.*)—" Cementing, " hardening, and tempering rails for railways, and also axles for " *railway carriage wheels.*"

"For this purpose the rails and axles after being manufactured
" are submitted each of them in a special furnace to the action
" of the following composition, wholly or in part according to
" the kind of rails and axles required, viz., charcoal, grease, hoof
" parings, tartar, coarse sugar, rosin, saltpetre, and sand. The
" tempering must take place after the cementation and hardening
" is made."

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 2.—N° 1752.

GREAVES, HUGH.—"Improvements in constructing streets, " roads, and ways, thereby facilitating traffic and providing for " the more convenient conveyance of sewage, drainage, gas, and " water supplies and telegraphic wires along the same."

Part of these improvements consist in supporting water, gas, and other pipes upon columns, which pipes may also be used to support the rails of an overhead railway.

There is also described a curb, "constructed in the form of a " hollow channel or pipe, having openings along its sides to " admit the surface water from the roadway and foot pavement." " The pipe or channel curb may, in some cases, be formed with " one edge rail of a tramway attached thereto, the other rail " of which may be laid in the roadway, and also formed as a " pipe."

[Printed, 10*d*. Drawing.]

A.D. 1858, August 6.—N° 1794.

CAREY, STEPHEN.—"An improved system of forming the " permanent way of railroad transit, also common tramway and " channel or watercourse, by the means of cast-iron plates or " boxes peculiarly constructed, so as to make one continuous " way or channel."

The plates or boxes are put together side by side, or end to end as may be most convenient, to make a channel at the sides of streets or other roadways; the said plates are made to joggle or rebate together at their ends or sides, so as to make the plates combine together to form one plate or channel or tramway. "The " plates may be used in constructing the permanent way for rail- " ways, in that case they would have cast on their upper surfaces " flanches to receive the rail, which would be so constructed as to

" receive a cast-iron rail made in a T form, with the lower part " roached or curved to act upon a spring of steel, india-rubber, " or wood. The two continuous lines of plates to receive the " rail would be attached together by means of cast-iron or sheet- " iron plates, instead of transverse sleepers. The object of cover- " ing plates is to exclude the rain or wet, so as when laid there " will be a much less liability of getting out of repair."

[Printed, 10*d*. Drawing.]

A.D. 1858, August 31.—N° 1971.

MENNONS, Marc Antoine François.—(*A communication.*)— " Improvements in the supports for railways."

The invention consists " in an improved arrangement of metallic " rail supports, the main feature of which is the obviation of " direct contact in their separate parts by the interposition of " compressible semi-elastic matters, the result of which is an " increase of solidity and a reduction of the wear and tear which " necessarily arises from the direct action of the unprotected " metallic surfaces."

Various methods of carrying it out are shown.

[Printed, 6*d*. Drawing.]

A.D. 1858, September 14.—N° 2089.

COCHRANE, William Erskine.—" An improvement in the " fastenings of railways."

The improvements consist " in the introduction of pins or rods " of a hard material, which will not shrink transversely through " the wood fastenings, so that the ends of the metal or other " pins or rods may come flush with the sides of the wood fasten- " ings. By this means, when a wood fastening is driven in " between the cheek of a railway chair and a rail or rails therein, " the ends of the pins will come in contact with the inner sur- " face of the chair and with the rail or rails therein, and will, " notwithstanding the shrinking of the wood, still retain the " rail or rails secure."

[Printed, 10*d*. Drawing.]

A.D. 1858, October 5.—N° 2209.

MENELAUS, William. — " Improvements in machinery for " *straightening rails* and wrought-iron bars."

The "machinery consists of a block or standard carrying a "bell-crank lever, in which two or more rams or sets of rams "are fitted, one ram or set of rams to act horizontally; and the "other ram or set of rams vertically, and of an angular bed in "which the rail or bar to be straightened is supported. The bar "rests upon and is received against two sets of bearings, each "set being composed of two or more blocks, three being pre-"ferred. The rams are so placed with respect to the blocks as to "work between them. At every stroke of the lever the two sets "of rams are brought into action, and as fast as each portion of "bar is straightened, it is pushed forward by the action of the "machine or otherwise until its whole surface has been acted "upon."

[Printed, 10*d*. Drawing.]

A.D. 1858, October 11.—N° 2258.

SAXBY, John. — "Improvements in apparatus for working "signals on railways."

The signal is to be actuated by the passing train. "The engine "wheel in passing is made to depress a lever placed at the outside "of the rail, which lever working on a centre, and at the same "time rising at the other end, disengages a sliding bar which "governs machinery for adjusting the lamps and signals to the "position for showing danger, when it becomes fixed until released "by a lever and chain connected with the signal box." "By a "further arrangement, the chain spoken of as passing to the signal "box is connected to mechanism so arranged that if the signal is "given for the main line, the distant signal for the branch line "or sidings must of necessity from this arrangement be set at "danger, and vice versa. The distant signal can be so connected "with the siding or station signals, and also with the points, so "as to make it impossible for the signal man to give a contra-"dictory signal or to hold over the wrong points." The setting of the distant signal to "danger," tightens a wire which pulls down a lever. This frees a stop, by means of which the point lever is locked at all other times. The inventor refers to his previous patent of A.D. 1856, N° 1479 (in the present Specification *erroneously* numbered "1476").

[Printed, 1*s*. Drawings.]

A.D. 1858, October 29.—N° 2413.

KIRRAGE, William.—"An improved elastic combination of "materials impervious to atmospheric influences, as a substitute "for hard woods, metal, leather, or felting, and for other pur"poses."

The patentee says, "If the new compound is intended for "cushions under springs for railway carriages, or locomotives, "or for buffers to the same, or for cushions under springs for "carriages, gigs, or carts, or for cushions under heavy vehicles "when no other springs are used, or for cushions under iron "chairs used for supporting iron rails on railways. . . . . "I take sixteen pounds of india-rubber, twenty-five pounds of "tar, forty-eight pounds of finely powdered chalk, sixteen pounds "of hemp, and ten pounds of sulphur."

"These substances are to be formed into a compound moulded "and hardened."

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 1.—N° 2433.

CARISS, John.—"An improved safety switch box and gear."

The invention consists "in constructing a switch box, so "that the lever is made to lay in a horizontal position within "the cover of the box, and parallel to the line of rails, by "which means accidents arising from the levers standing up "are prevented."

[Printed, 1*s*. Drawings.]

A.D. 1858, November 9.—N° 2504.

DICKSON, John Farmerly.—"Improvements in the con"struction of railway chairs and other details connected with the "permanent way of railways."

The improvements consist:—

Firstly, in an improved chair having that part upon which the rail rests extended, and also in constructing such chairs, so as to give an elastic bearing to the bottom of the rail.

"Secondly, of an improved adaptation of wrought instead of "cast iron in the formation of railway chairs, whether such chairs "form part of wrought-iron sleepers, or are used as ordinary "chairs upon wood or other bearers."

Thirdly, in an "improvement in 'fish-joints,' wherein the "bottom of the rail bears upon one of the wrought-iron 'fishes' "resting upon the chair on either side of the joint."

Fourthly, in supporting the rail "between blocks of wood or "metal, the lower surface of such rail not resting upon the chair "or sleeper."

Fifthly, in an improvement in railway keys or wedges, "formed "of metal so as to receive a block or packing of wood or other "elastic material." And in constructing the chairs so as to allow "a packing of wood or other material to be inserted, in which "case keys wholly of metal may be applied."

[Printed, 6*d*. Drawing.]

A.D. 1858, November 9.—N° 2516.

ORDISH, Rowland Mason.—"Improvements in constructing "the permanent ways of railways."

The invention consists:—

"Firstly, in holding and supporting rails of railways by means "of metallic sleepers, constructed somewhat in the form of "hollow oblate spheroids, having their vertical considerably less "than their horizontal diameter. . . . . The upper portion of "the shell of each sleeper" "is partly cut away, so as to admit "of the jaws formed thereon being sprung slightly farther "asunder, in order after the rail has been placed in position "between them, to admit the introduction of a block, wedge, or "key, between the rail and one or both of the jaws." The block is formed with projections corresponding with indentations formed in the inside face of the jaw, whereby, when it has once been placed in position, and the jaws, after being sprung in order to insert it, are allowed to exert the pressure due to their elasticity, it is securely held and cannot be removed until the jaws are again sprung asunder for the purpose.

"Secondly, in constructing chairs intended for attachment to "wooden or other sleepers, of such form as to be slightly elastic "and to permit the jaws formed thereon to be sprung asunder, "and by their re-action to hold the rail either with or without "the intervention of blocks, wedges, or keys."

"And, thirdly, in securing the ends of two adjacent rails (laid "upon wooden or other sleepers) where they abut or come "*together by* means of a metallic spring clip forming a curve

" beneath the rail, and having its edges acting upon plates, " situated upon each side of the web of the rail."

The use of "doubly inclined metallic wedges" for various purposes, such as securing tie bars, rails, &c., is also claimed.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1858, November 11.—N° 2532.

BENSON, Martin.—(*A communication.*)—" An improved manu" facture of rails for railways."

"The improved rail is of the **T**-form, but with a pear-shaped " hollow in the head, the walls or sides of the rail are concave on " their outer surface, and their inner faces are made parallel for a " certain height, and brought into contact, thus when the rail is " loaded the walls of the rail will have a tendency to press together, " and make the rail as strong as if they were welded together."

The inventor also claims the system of rolls, by which he is enabled first to make a rail of **U** shape, and from this to make a tubular **T** rail.

[Printed, 10*d*. Drawing.]

A.D. 1858, November 16.—N° 2573.

SAMUEL, James.—" Improvements in sleepers or bearers for " rails."

The invention consists " in constructing the sleepers in a hollow " semi-spherical, or semi-spheroidal, hexagonal, or other poly" gonal form, ... with a straight-sided or with an angular" sided trough formed therein or thereon, in such manner that, " by the aid of blocks or wedges of wood, or other like suitable " elastic material placed at each side in the web of the rail, it may " be supported clear of the bottom of the trough. The sleepers " may be plain or corrugated, and are intended when laid to be " packed or filled on the inside with ballast. They may be made " of cast or wrought iron, and may be made by stamping or by " any other approved method of manufacture."

[Printed, 10*d*. Drawing.]

A.D. 1858, November 16.—N° 2576.

JOHNSON, William Beckett, and SHEPHERD, Joseph.—(*Provisional protection only.*)—" Improvements in machinery or " *apparatus for adjusting* the permanent way of railways."

The invention consists in ballasting the rails, "by the employ-"ment of apparatus upon the lever principle, as distinguished "from the ordinary method, which consists in ramming the bal-"last; thus to an arm capable of being hooked on to the sleeper "or rail" a lever is jointed, "which being caused to turn thereon "forces the ballast forward. A similar apparatus" is employed "for twisting the rails into their correct position when displaced, "the lower end of the lever being in this case caused to bear "against the rail."

[Printed, 4*d.* No Drawings.]

A.D. 1858, November 30.—N° 2725.

LUIS, Jozé.—(*A communication from Leon Barraux.*)—(*Provisional protection only.*)—"A new railroad, with continued sup-"ports splintered together without any wood being used."

The present invention "has for principle the direct support of "the rail on the ballast in its whole length, and to give it the "necessary stability, by adding to the base an auxiliary surface, ". . . . to obtain the same size of surface for support as in the "road having cross beams." This surface is not manufactured "with the rail, "but at the time of placing the rails it is bound "with it by means of hooks and bolts of iron, which permit "of an easy dismounting and replacing." "The arrangement of "the system of the fastenings of the rail on its auxiliary base "is such, that the trepidation of the road and the jolts that it "receives are quite powerless in producing the least slackness or "looseness."

[Printed, 4*d.* No Drawings.]

A.D. 1858, December 1.—N° 2736.

BOW, Robert Henry.—"Improvements in railway chairs and "fastenings."

The invention relates to "an arrangement of railway chair "wherein the rail is held . . . . by three dead or fixed resisting "surfaces, the retaining pressure upon which is brought into play "by a fourth pressure, arising from the action of a binding wedge "or key or by a screw or other fastener."

"These three pressures are brought into action by the pressure "*of a*" key "fitting into and pressing against a corresponding "*concavity* in the interior of the higher jaw of the chair on one

" side, and on the other against the outer side of the rail at the " point where the lower side of the web joins the bottom flange." In the chairs "the inner jaw is only about half the height of the " outer one; and ths latter is formed with a shallow concavity " running horizontally along its central portion. A screw may " be substituted for the key."

Various adaptations of the principle are shown.

[Printed, 10*d*. Drawing.]

A.D. 1858, December 8.—N° 2817.

WESTMACOTT, CHARLES MARTIN.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

For the purpose of fixing fish plates to rails, rails to chairs and sleepers, or chairs to sleepers, screw bolts are employed " having heads at one end and right and left-handed screws cut " on the other. The screw thread, which is furthest from the " head, is formed on a part of the bolt which is smaller in diameter " than the part on which the other thread is cut; these screw " threads receive nuts which are screwed on in opposite directions, " and of which one serves to lock the other, or the screw nearest " the head is arranged to screw into a hole tapped in the fish plate " or rail, or other part to be secured."

" In the construction of permanent ways in which transverse " sleepers and chairs are employed," cushions are placed " exterior " of the chair and on each side of it, so that the under side of the " rail may rest on these cushions; in this manner a longer bearing " surface is provided for the rail than when it is supported by " the chair only, as is usual, and in arranging the chairs for supporting " the rails in place of forming them with two fixed jaws " with sufficient space between them to receive both the rail and a " wooden key," " the end of one of the jaws " is made " a detached " piece " which drops in between the rail and the other part of the " jaw, and is secured by a bolt passing through it and through " the bottom of the chair, and is of a such a form as when in " place to hold the rail without the use of a key." In some cases cushions of wood are employed between the parts of the chair and the rail.

Double-headed rails may also be fitted in troughs furnished with wings resting on and in the ballast. Instead of using fish plates, metal *troughs may be* used to fit over the lower part of the rails.

[Printed, 4d. No Drawings.]

A.D. 1858, December 17.—N° 2893.

JOHNSON, WILLIAM BECKETT.—"Improvements in machi-"nery or apparatus for preparing for joining the rails of rail-"ways."

The invention consists firstly, in a method of cutting the rails so as to obtain correct lengths. For this purpose a portable apparatus is employed, which may be transported to any part of the line, and constructed with a cutting tool caused to reciprocate by an excentric or other such apparatus, and the traverse is gained for the cut by suspending the tool upon a centre, on which it is caused to swing.

Secondly, in apparatus for making 'fish joints,' or other joints of similar requirements, and consists in combining the above cutting apparatus with a drill or drills, so that the two operations of cutting to length and drilling the holes may proceed simultaneously. And as applied to making the said "fish joints," in using a combination of two or more drills without the cutting tool, so that the like number of holes may be drilled at the same time.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1858, December 24.—N° 2950.

JOHNSON, JOHN HENRY.—(*A communication from Christian E. Detmold.*)—"Improvements in the permanent way of rail-"ways."

An improved mode of joining and fastening the ends of the rails, whereby the rail ends are kept in the same vertical and horizontal planes without any other description of fastening, the rails being also left entirely free to expand and contract.

"It is proposed to cut notches in the web or shanks of the rails "at their ends, and to insert into" them iron joint pieces "of "such a section as to enable them to fit accurately into the slots, "and at the same time to fit against the sides or under the head "of the rail."

[Printed, 6*d*. Drawing.]

A.D. 1858, December 30.—N° 2986.

HEYNE, JOHN FRANCIS COLFS.—(*Provisional protection only.*) —"*Improvements* in railway chairs and rails, and in the mode of "*fixing* the same."

The invention consists "in shaping longitudinally the inner "surface of the rails so as to present a transverse curvilinear con"cavity to the back of the chair, which is also shaped in similar "manner for receiving the same, whilst the outer surface of the "rail is provided with suitable key plates fitting closely within "the ordinary channel or groove of the same, and the whole "secured together through the medium of bolts and nuts, by which "arrangement the rails, on being worn out and flattened at the "upper face," may be taken out and reversed, "a key way and "key being employed in connection with the seat of the chair for "tightening or wedging the rail, when required, together with a "double surface chair, and tightening bolts at the joint or "juncture of the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 31.—N° 2998.

JOHNSON, JOHN HENRY.—(*A communication.*)—"Improve"ments in the permanent way of railways."

The invention consists "in the application and use of fish plates "or bars, which hold the rails at their base by their lower rib "or flange in place of holding" them by the web. These "under "fishes" "make use of the lower part of the rails for the purpose "of consolidating their union." "The perforating of the rails "for the passage therethrough of fish bolts is entirely obviated. "For the ordinary double-headed rail the fish is made in the form "of two grooved jaws which fit on to opposite sides of the lower "flange of the rail, and are held together by transverse bolts "underneath the rail, and are bolted or pinned down on to the "sleepers. These fishes may also be used in combination with a "cast-iron chair bolted to the sleeper."

"When a trough rail is used, the fishes are bolted down on to "a separate sole or base plate, and their edges protrude over the "expanded flange of the rail, and in some cases a strengthening "rail may be formed longitudinally along the under side of the "sole or base plate. This plate may be applied in combination "with the fishes to the bridge rail and to the ordinary flange rail, "suitable projections being made on the upper surface thereof for "the fish plates to rest upon. Lugs may be formed, if necessary, "upon the sole plates for the purpose of pinning them down "*to wooden sleepers*, when sleepers are employed, but in many

" cases this system of support will enable the rails to be laid
" directly upon the ballast, thus forming an entire metal way."

[Printed, 10*d*. Drawing.]

1859.

A.D. 1859, January 5.—N° 42.

CORFIELD, William, the younger.—" Improvements in chains
" for coupling cranes, cables, mining purposes, hoisting, and all
" other purposes where chains are used."

To prevent accidents happening from the breakage of chains, instead of making chains of single links, it is proposed to form them in double links, one set being a little longer than the other, so that when any strain is applied the short links only receive it; but should any of the short links break or snap, either from wear or flaw in the manufacture, the longer links then take the strain.

[Printed, 4*d*. No Drawings.]

A.D. 1859, January 13.—N° 112.

BANKS, Daniel Lancaster.—" A method of constructing a
" travelling suspension rail or roadway, applicable, among other
" uses, as a bridge and lifting agent."

The patentee says, " My invention consists in laying down
" . . . . two rails or sets of rails . . . . between which the sus-
" pension railway is to be constructed and used. I mount a
" stout frame upon railway or other wheels, and set a similar
" frame upon both sets of rails. The frames carry the uprights,
" which are to form or act as buttresses, between which the sus-
" pension chains . . . . are to be carried. In order to give
" stability to and maintain the buttresses in their position, I
" carry bars downwards from the frame, and mount rollers or
" wheels horizontally on the lower ends thereof, which wheels run
" against the ground or masonry beneath the surface of the earth
" or level of the rails, and are prevented from rising by a pro-
" jecting flange or block fixed beneath and parallel to the rails.
" The frame is weighted, and, if found necessary, counterbalance

" and weighted levers are run out laterally from the buttresses,
" in order further to give support and steadiness to them.
" The suspension chains or rods carry pendant rods, wires,
" chains, or bars, to which a rail or roadway extending from
" buttress to buttress, and from one set of rails to the other, is
" attached."

"Where required, I provide means for causing my suspension
" railway to travel along a set of rails laid at right angles or
" diagonally to one of the sets of rails. In such case temporary
" supports will become necessary," and "by the adaptation of
" chains, ropes, and windlasses, the suspended way may be used
" for raising or lifting weights."

" Again, should the way not be strong enough to support any
" carriage or article passing over it, support may be given to the
" same from below."

The drawing thus represents a suspension bridge supported on traversing trucks at the extremities.

[Printed, 10*d*. Drawing.]

A.D. 1859, January 15.—N° 131.

BANKS, Daniel Lancaster.—" Improvements in the method
" of constructing a travelling suspension rail or roadway to be
" used for the cultivation of land."

Improvements on the Patent, 1859, N° 112.

The patentee says, " instead of having the rail or roadway to
" extend from one set of rails to the other, I have an opening left
" between the one set of rails and the other, so that a frame or
" other apparatus projecting from the carriage may traverse
" between the two rails or sets of rails, or be suspended beneath
" them. I also provide means for lengthening or shortening the
" upright suspension rods so as to accommodate the suspension
" rail or roadway to the undulations of the ground, for instance,
" by having the upright suspension rods constructed with sliding
" joints, or by other mechanical means."

" And instead of two lines of suspension rods, and upright rods
" and rails, ... I use only one, or more than two lines of suspension
" pension rods with the necessary upright rods and rails."

A cultivating carriage travelling along the railroad " I actuate
" by means of shafts passing from buttress to buttress, carrying
" a wheel or wheels which drive other wheels, which work into
" *a rack attached to* the rail or roadway, or by an independent

" stationary engine, or by the engine or engines connected with " and intended for moving the buttress or buttresses."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1859, January 19.—N° 161.

CLARKE, Thomas. — " Improvements in the manufacture of " core barrels for pipes or columns, used either for railway piles " or columns, or for water pipes or sewerage pipes."

" Heretofore core barrels have been constructed with one row " of hinges only and a loose key or slide, which key or slide " has had to be removed every time a fresh casting is produced, " whereas according" to the present invention a core barrel is " constructed with two rows of hinges and without a slide or key, " but with three stay bars, which when loosened allow the core " bar to leave the casting without impediment, thereby effecting " considerable saving of labor, time, and expense."

[Printed, 10*d.* Drawing.]

A.D. 1859, January 22.—N° 203.

DORSETT, Edward, and BLYTHE, John Bennington.— " Improvements in the distillation of oil from coal tar, and in " apparatus for preserving timber therewith."

The patentees say, " For preserving railway sleepers and other " timber with tar, oil, sulphate of copper, or other preservative, we " employ an open tank mounted on a suitable wheel carriage," " and divided into compartments by partitions furnished with " the necessary heating apparatus," and having pipes, " which " form junctions with a vacuum cylinder or closed compartment of the tank which can be closed at pleasure; the ends of " the said pipes are supplied with perforated plates and washers " according to the size of the timber to be preserved, and at " the other end of each compartment are suitable appliances for " pressing the sleepers or timber against the perforated plates. " Having placed the sleepers or timber so attached in one compartment of the tank, we cover it with creosote or other preservative fluid," " and apply heat thereto, and having obtained " a partial vacuum in the cylinder," " we open the connection " with the sleepers through the pipes, and the heated liquid in " the tank is drawn through the sleepers into the cylinder."

[Printed, 10d. Drawing.]

A.D. 1859, January 22.—N° 206.

RAMMELL, THOMAS WEBSTER. — "Improvements in atmo-" spheric propulsion, and the structures, tubes, machinery, and " apparatus applicable thereto."

Relates more particularly to the structures upon which the carriages are to run, which are to be of iron, and so arranged that they may conveniently be erected in towns along the central lines of wide streets and thoroughfares. One line of railway is placed above the other, and both are supported upon a single row of columns, the upper line resting immediately upon arched ribs springing from the tops of the columns. Wrought-iron girders span the spaces between the columns, each pair containing and supporting between it the rails and tubes constituting a complete line of way.

" Also to an arrangement of the termini of such railway, in " such manner that a portion of the line at each terminus, with a " train of carriages upon it, may be raised or lowered bodily " between the limits of the upper and lower lines, so that the " trains of carriages arriving at one end of such railway may be " raised vertically from the level of the lower line to the level of " the upper," or vice versâ.

Also, to the propulsion tube having in it a longitudinal groove or grooves, and to the use at the stations of any atmospheric railway " of a continuous propulsion tube containing valves so " placed that a separate chamber is formed, in which the travel-" ling piston may be received and brought to rest, and from which " it may be again started."

" Also to the construction of the longitudinal valve of the pro-" pulsion tube, which valve is to have a parallel slide movement, " and that of the apparatus for opening and closing such valve."

Also to methods of shutting off the propelling power, of arranging chambers for the reception of the carriers to the construction of a pillar post in connection with the atmospheric line, and finally to an improved air-pumping engine.

[Printed, 1s. Drawings.]

A.D. 1859, January 24.—N° 219.

CAITHNESS, JAMES, Earl of.—(*Provisional protection only.*)— " Improvements in parts of the permanent way of railways."

This invention relates to switches, and consists " in making a " *portion of one or both* the rails at the 'points' or change of

" line, slide along inclined parallel slots, the two ends of such " sliding rails, and the ends of the stationary abutting rails being " bevelled to correspond to the incline or bevel of the slots, " whereby an overlap bevel joint is obtained when one of these " sliding rails is used. The pointed swivel switch rail remains " unaltered, and is coupled with the opposite switch rail in the " ordinary manner, but the rail end is bevelled in place of being " cut square off. To this latter rail is fitted a slide, which is connected with that portion of the rail which works in parallel " slots, so that on the slide being moved by the lever which opens " or closes the switch, it carries with it the loose rail, and causes " it to travel in its parallel inclined slots, and change the points " accordingly."

[Printed, 4*d*. No Drawings.]

A.D. 1859, February 8.—N° 356.

REDMAN, JOHN BALDRY. — "An improvement in the construction of carriage ways."

The improvement consists in forming the wheel ways of metal; while the space between may be filled with paving. The whole " street is so paved and the carriage way so constructed as to allow of horses, carriages, and wagons, passing over every part though the wheels only should travel on the metal. The surface of the iron upon which the wheels are to travel is formed, with a diamond or other like raised pattern. This surface is the upper part of a trough, laid down upon concrete or other like material, and each trough is bolted and secured to the next, in such manner as to allow for expansion and contraction, while at the same time the fastening "admits of ready removal, in order to take up any " one as occasion may require."

[Printed, 10*d*. Drawing.]

A.D. 1859, February 10.—N° 376.

COVERT, WILLIAM ADOLPHE.—(*A communication from Charles L. Spencer.*)—" An improved self-acting railway switch."

The switch is so to be arranged that the engine driver or guard shall have full control over the points whilst the train is at full speed. "The two outer rails, and the inner rails or points are " fixed, and the change of direction is effected by two guide rails " *or 'switches'* connected together by a tie, and turn upon pins " *at one end.* Outside the fixed rails are two moveable rails,

" connected together by a cross bar, and furnished with inclined " planes. The cross bar is provided at or near its centre with a " projection, which acts upon the tie connecting the switches. " The engine and tender, and the last carriage of each train are to " be provided with two small rollers capable of being raised up or " lowered by the driver or guard, and so connected together that " the depressing of the roller on one side shall cause the raising " of that on the other side. If the engineer desires the train to " run off on to a siding at the right hand," "before reaching the " points he depresses the right hand roller. As the engine " approaches the points, this roller coming against the inclined " plane will thrust the moveable rail on that side outwards, and " by means of the cross bar draws the switches into the required " position. The projection on the cross bar gears into a peculiar " form of locking cam, consisting of a circular plate provided with " a notch and two projecting fingers or catches, and capable of " turning on a pin on the tie connecting the switches, which prevents the switches from being moved by any other agency than " the action of the moveable rails."

[Printed, 8*d*. Drawing.]

A.D. 1859, February 14.—N° 412.

CLARK, Josiah Latimer.—" Improvements in the means of " working railway signals and switches."

In arranging at or near the foot of the signal post or switch two hydraulic cylinders, " each furnished with a pipe leading to " the place from whence the signal or switch is to be actuated, " and at this place is a force pump " by means of which water may be forced into one or other of the cylinders, and they are also connected together in such a manner that when the piston or plunger is forced forward by water being injected into the cylinder, the plunger or piston of the other cylinder is pushed back to its original position, and the water which the cylinder contained is caused to flow back by the pipe to the place where the force pump is situated, " and there it is caused to flow into a measuring " vessel, so that the person working the force pumps may know " by the quantity of water returned by the pipe when the required " amount of motion has been produced."

The hydraulic mechanism is so arranged "that however much " *the space passed* through by the moving parts of hydraulic

" apparatus may exceed that which is necessary, only just the " amount of motion required will be communicated to the signal " or switch."

The patentee also proposes to work signals and switches by two " wires in place of the single wire usually employed."

[Printed, 1*s*. Drawings.]

A.D. 1859, February 22.—N° 483.

CLARK, William Stettinius. — (*A communication from Sidney A. Beers.*) —(*Complete Specification but no Letters Patent.*) —" Improvements in the formation of cast-iron rails for city " railways, and also in the method of uniting the ends of two " adjacent rails for railway use."

The patentee claims "the construction of an upright self-" sustaining rail of cast iron, with car and carriage track combined, " and secured and united at the joints by an upright iron splice " wedge; and also the application of the splice wedge to any kind " of rail by the addition of cleets, either in parallel lines to receive " and hold the compound wedge, or by converging lines of cleets " at and adjoining the ends of the rail to receive and hold the " single wedge separately and combined."

[Printed, 6*d*. Drawing.]

A.D. 1859, February 23.—N° 497.

TURNBULL, George.—" Improvements in the permanent way " of railways."

In constructing the railway, longitudinal sleepers of iron are used, and the rails are fixed thereto by screw bolts and nuts. The horizontal upper surface of the sleepers is made of a greater width than the widest part of the lower surface of the rails to be fixed thereon, and the upper surface of the sleepers is formed with a longitudinal groove or recess only slightly wider than the under surface of the rails, to prevent their moving laterally. The whole width of the sleepers is formed flat, so that it rests horizontally on the surface of the earth below. In order to preserve the gauge of the sleepers and rails, transverse ties are fixed at intervals under the longitudinal sleepers or bearers by screw bolts and nuts; these ties are flat at their upper surfaces, and they are turned down at right angles at their edges. The flanches or turned-down edges of the longitudinal sleepers or bearers are cut away where the ends of the transverse ties come under the sleepers or bearers.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, February 24.—N° 507.

PRICE, Enock, and HAWKINS, Edmund.—"Improvements " in the mode of forming fish plates, and in the mode of fixing " or attaching them to the joints of rails on railways."

The improvements are, firstly in forming the fish plates "in " such a way that either side of the plate may be placed against " the side of the rail," and each plate may be used on either side of the rail. This is done by forming the fish plates identically similar to each other, and also that the outline "of each shall be " symmetrical about a mesial plane, passing either longitudinally " or transversely through it; thus, supposing a plane to pass " through the axis longitudinally, the outline of the fish plate on " the right of the plane would be exactly similar to that on the " left; this outline will vary slightly to suit the different kinds of " rails to which the fish plates are applied."

Secondly, to keep them fixed to the rails, the bolt is made spuare, with a thread on the end for the nut, and the holes in the fish plates are rectangular. By this arrangement it becomes impossible for the bolt to turn or oscillate when put through the fish plates, nor can it get loose when properly tightened.

Further, the bolts may be secured by putting a bridle on each pair.

[Printed, 8*d*. Drawing.]

A.D. 1859, March 7.—N° 591.

CABANY, Armand.—(*Provisional protection only.*)—"A new " system of quoins (wedges) for railways."

The patentee proposes "to substitute for the ordinary quoin or " wedge used to maintain railway chairs and rails in position " one" which is termed "a double or twin wedge so arranged " that the parts shall (as it were) dovetail the traction and lateral " jerks of the rolling stock at speed, serving more securely to fix " the combination of rail, wedge, and chair together than to loosen " the adhesion."

"On single lines of rail these wedges . . . . should be placed " *alternately one* way and the other, but on double lines of rail, "where the traction is always (or nearly so) in one direction; the "sharp end of the wedge in contact with the rail should be in the "sense of the traction."

[Printed, 4*d*. No Drawings.]

A.D. 1859, March 7.—N° 596.

AIMONT, Pierre Ernest.—"Improvements in the construc- "tion of waggons and other carriages for railways and ordinary "roads, and of apparatus connected therewith."

"Parts of the invention consist in forming rails with an upright "tongue, and with the bottom sloping upward from the middle "towards both sides, so that wedges may be conveniently placed "under the rails as may be required to support them and keep "them upright. The successive lengths of rail are jointed "together by links, which allow of their conforming themselves "to curves and irregularities of the ground, and both rails and "wedges are bolted down by suitable spikes."

"Also, in forming an instrument with a plumb weight or similar "weight to indicate the middle of the track, and with upright "arms and transverse bars so combined as to determine the gauge "of the way as the rails are laid down."

And also in laying a single line of rails in the middle of existing lines and fitting middle wheels to the carriages.

[Printed, 8*d*. Drawing.]

A.D. 1859, March 15.—N° 649.

LANGTON, Walter.—"Improvements in the manufacture of "keys and wood fastenings used in constructing railways."

"For these purposes the keys and wood fastenings are com- "pressed and charred" "by forcing them through a highly heated "die formed internally to the section of the desired fastening; "pieces of wood of larger dimensions than the die are in succes- "sion forced through" it, "by which they will become compressed "and charred. When wood fastenings are desired to be larger at "one end than the other, it is preferred to force the pieces of "wood into a properly shaped and highly heated die, and then "to force the charred fastenings back out of the die, or the dies "used may be made in parts, and the parts made capable of "movement."

[Printed, 4*d*. No Drawings.]

A.D. 1859, March 16.—No 665.

DENYS, Joseph Michel.—" Certain improvements in the " construction of railway crossings."

The invention consists " in the employment of a cast-iron table " or plate of any suitable form, having lugs cast thereupon, by " means of which it may be bolted to the ordinary wooden " sleepers. Upon the top of this " " are three wrought iron or " steel crossing pieces, their upper faces being formed similar to " the ordinary rail, but are made tapering or conical at their " lower extremity. These three crossing pieces are securely held " in their places by means of wrought iron or steel plates fixed " between them, and formed tapering or dovetailed at the edges, " and secured by bolts to the top of the cast-iron table."

[Printed, *6d.* Drawing.]

A.D. 1859, March 21.—No 707.

HAGGETT, William.—" An improved method of treating " metals and other materials to increase their strength."

This method lies " in giving to iron and other metals, by rolling, " pressing, or casting, an undulated surface, composed of " longitudinal and transverse corrugations, crossing each other " at right angles, or diagonally at other angles," " and also in " giving a similar surface to " " all other materials capable of " being pressed and moulded, whereby an ornamental surface is " produced, and the strength of all such metals and other materials " is increased, rendering them more suitable for many " architectural and mechanical purposes."

It is mentioned as applicable to " railway and tramroad works."

[Printed, *6d.* Drawing.]

A.D. 1859, March 22.—No 727.

BANKS, Daniel Lancaster.—" Improvements in suspension " rail or roadways, and in machinery or apparatus connected " therewith."

This refers to the inventor's previous patents Nos. 112 and 131 of A.D. 1859. The invention consists in laying down at any desired distance apart two or more rails or other manufactured ways. Upon these ways are placed across from way to way at any desired distance apart two travelling suspension ways constructed *in the manner described* in the Patent A.D. 1859, No 131, again, upon these ways are set frames on wheels or carriages which serve to act as buttresses, and between these carriages or buttresses a suspension rail or roadway is constructed. Upon the travelling or suspension railways are placed carriages to which are attached implements or machines to be used for the cultivation of the land.

[Printed, 10*d*. Drawing.]

A.D. 1859, March 23.—N° 740.

BBOWNE, Benjamin.—(*A communication from Victor Armand Prou.*)—" A new method of working or operating switches and " signals on railways by improved apparatus for that purpose."

The invention consists " in working switches and disc signals " . . . . by causing the flanges of the running wheels of the car- " riages and levers connected to the engine to actuate mechanism " fixed at certain parts " of a railway. This apparatus consists " of a hydro-pneumatic swing table, connected with which are " pumps in which oil is placed " of a non-siccative character, and not capable of congealing in cold weather. The pistons of the pumps are worked " either by exhausting air therefrom, or by " compressing the oil therein, or both." Two handles or levers are connected to the engine, " which are operated upon by the " switches, and sound the whistle on the engine when the train " arrives at or near a station." It is proposed to connect the switches " to or with the aforesaid pumps by means of rods and " chains, so as to raise the piston of one pump, thereby causing " the piston of the other pump to descend." The pistons " are " operated upon by the wheels of the locomotive as they pass " over chains working on pullies placed in the line of railway, " and said pumps are connected by rods and chains to the disc " signals and switches respectively, so that according to the " direction " in which the train is going, " in like manner the " disc signals and switches will be properly operated upon for " the next or succeeding train."

[Printed, 10*d*. Drawing.]

A.D. 1859, March 25.—N° 759.

HILL, Christopher. — (*Provisional protection only.*)—" Im- " provements in the permanent way of railways."

" For this purpose when supporting the rails of railways by " *means of* side bearing plates " having flanges on one or both " *of their sides,*" which are fixed to the rail, the rail is formed with a web, "which projects downwards below the bearing plates, "strengthening the rail itself, and preventing it and the bearing "plates from moving sideways, and the lower end of this web or "keel may be formed with a flange on each side."

When using bridge or trough rails, with wrought-iron bearing plates, the flanges are placed on the sides of the bearing plates, "within the hollow of the rail and between the two flanges of "the side bearing plates" is placed the upper end of a web or keel . . . . . which projects downwards below the bearing plates. The flanges of the plates and the head of the web exactly fit within the hollow of the rail, and are held together by bolts.

Modifications of this system are shown.

[Printed, 4d. No Drawings.]

A.D. 1859, March 26. – N° 768.

MUIR, MATTHEW ANDREW, and McILWHAM, JAMES.—"Improvements in moulding or shaping metals."

The patentees claim—

"The system or mode of manufacturing or producing railway "chairs, or railway chairs and sleepers cast or combined in one "by means of" certain moulding apparatus.

"The application and use in moulding or shaping metals of a "traversing sling with suspension rods adjustable as to their "combined operating length" "for transferring the mould "box."

"The system or mode of raising and lowering the mould box "by means of traversing suspension rods connected to each other "by a lever in such manner as to enable the operator to lengthen "and shorten the line of suspension."

"The application and use in moulding or shaping metals of a "duplex action lever, connected to a pendent hooked link for "working the 'draw' of the pattern."

"The system or mode of heating the pattern plate and pattern "for forming the lower part of the mould by means of a heating "box."

"The system or mode of connecting and disconnecting the "mould box and pattern plate by means of pendulous weighted "catches."

"The system or mode of effecting the withdrawal of the pattern "from the sand by means of" certain "drawing or lifting "apparatus."

And, finally, "the system or mode of moulding or shaping
" combined chairs and sleepers and other articles wherein, after
" the sand is rammed, the mould box is swung off its seat, turned
" over upon its suspension trunnions, then turned half round
" horizontally, and placed upon the drawing table."

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1859, March 29.—Nº 788.

BURT, Henry Potter.—"Improvements in apparatus for pre-" paring and preserving timber."

This relates to apparatus for impregnating railway sleepers and other timber with creosote or other preservative liquids, and with solutions for colouring the wood, or for rendering it incombustible, a strong metallic cylinder is employed with an air pump for exhausting the air, and a force pump for forcing in the liquid.

The sleepers are packed on carriages, which are pushed into the cylinder, and the end of the cylinder is then put on and secured. The air is then exhausted by the air pump. The air within the pores of the wood expands and drives out the water and sap contained in it, which runs through a valve into a vessel at the bottom of the cylinder. The creosote is then admitted and pumped in until a considerable pressure per square inch is produced, which forces the liquid into the wood. The liquid is then drawn off, and the end of the cylinder is removed, and the carriages with the timber drawn out and unpacked.

A suitable tramway, the construction of which is described, is provided for the carriage to run on.

[Printed, 10*d.* Drawing].

A.D. 1859, March 30.—Nº 793.

EDWARDS, William Vaughan.—(*Provisional protection only.*)—"Improvements in the construction of ways and apparatus
" to facilitate the conveyance of mails, goods, and passengers."

For these purposes an enclosed passage "is constructed be-" tween distant places, with arrangements for stopping" at the stations to deliver and take mails, goods, and passengers. "At
" the lower part of such" enclosed way two parallel rails are formed in longitudinal grooves or recesses. The carriages have each four wheels, two before and two behind. The body of the carriage is supported by suitable projections at the fore and

hinder parts, and such projections receive the bearings or brases of the axles which are applied at their ends. "Each wheel is "fixed to a short axle, the inner end of which is received into and "is supported by a central bearing, so that the wheels may run "independently of each other, which will facilitate the passage of "the carriage round curves.

"The interior of each carriage is to be arranged according to "the purpose for which it is to be used, whether for the carriage "of mails, or goods, or passengers."

Atmospheric pressure is the propelling power.

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 14.—N° 938.

BEATTIE, Joseph.—"Improvements in the means of preventing "ing locomotive engines and carriages in motion on railways "leaving or running off the rails."

The patentee says:—"Locomotive engines and carriages are "frequently caused to run off the rail from two causes, videlicet, "from the jerking or other irregular action of the wheels occurring "ring after the breaking of the axle of one or more of such "wheels," and during or soon after the descent of an incline.

"My invention, therefore, is to prevent such results," "by "having a suitably formed ring of metal, cast on or affixed to the "inside of the boss of each wheel, with a lip or turned-down "edge, and I have on the axle of each wheel a ring of metal with "a lip or turned-up edge," so placed that it "will come between "the turned-down edge and the boss of the wheel, so that if the "axle break between such turned-up edge and the boss," the edges "will preserve it in a horizontal position, or nearly so, and "preserve" the carriages "on the rails." In some cases "an additional or check rail" is placed "parallel with the ordinary "rails at convenient positions on inclines or curves," "and I fix "such check rail" in a groove in the chairs, or by other suitable means, and firmly secure it to the ordinary chair, rail, or sleeper.

The guide rail will not only help to keep the wheels on the line, but will also assist in keeping them vertical should an axle break.

[Printed, 10*d*. Drawing.]

A.D. 1859, April 25.—N° 1034.

BUCKHAM, THOMAS. — (*Provisional protection only.*)—"An "improvement in railway switches."

The invention consists "in connecting the moveable switch "rail to the fixed head rail by a hinge joint 'fished' to each side "of the ends of the switch rail and head rail. One of the hinge "joints acting as the centre on which the switch rail moves, "whilst the other has the hole in which the pin fits, made oval "or slotted about one-eighth of an inch in the direction in "which the rail moves, in order to allow of the required move"ment of the switch rail."

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 25.—N° 1040.

WARNE, WILLIAM, FANSHAWE, JOHN AMERICUS, JAQUES, JAMES ARCHIBALD, and GALPIN, THOMAS.—"Improved compounds, applicable for packing the joints of "steam or other pipes, which compounds are also applicable "for packing or lining parts of machinery in general, or parts of "ships, bridges, tanks, or railways."

The invention consists "in combining together certain materials "to produce a compound which will be able to resist any degree "of heat to which it is liable to be exposed in use." The materials employed "are caoutchouc, or india-rubber, gutta "percha, or other elastic or flexible gums, bituminous, resinous, "or gelatinous substances, or any or all of these," "either alone "or in combination, to which must be added iron, steel, or other "metal filings or borings," or ores of iron or other metals or "oxide of iron, or manganese, or other metals, or earthy matters "containing iron or other metals."

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 12.—N° 1190.

SAXBY, JOHN.—"Improvements in the mode of securing the "rails on railways," consisting—

Firstly, "in a new mode of securing the keys of chairs so as to "prevent them from falling out or getting loose," by casting "a "hole horizontally through one of the jaws of the chair, through "*which a bolt*" is passed "having a screw and nut at one end,

" the other end being bent," "forming an L bolt, or a head may " be formed on it. This head bears against the larger end of the " wooden key, and the nut being screwed up tight holds the key " in its place." Modifications of this plan are described.

Secondly, in preventing the creeping or running of the rail by forming a "countersunk hole in the rail next the jaw of the " chair, in which" is placed a stud, "the head of which being " placed behind the key, is held in place by it. The stud pro- " jects through the rail and bears against the jaw of the chair, " and thus prevents the creeping of the rail."

[Printed, 10*d*. Drawing.]

A.D. 1859, May 24.—N° 1276.

STANSFIELD, JAMES.—(*Provisional protection only.*)—" Im- " provements in the permanent way of railways," consisting "in " having rails made in two parts, longitudinally and vertically, " joined together in such manner that the ends of each length " forming one side shall be in or about the middle of the opposite side, thus will each length overlap the other, which joint may be secured together by any suitable means.

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 2.—N° 1351.

SALTONSTALL, FRANCIS WALTER, and BUSH, ALFRED.— " An improved machine or apparatus for dredging and exca- " vating."

"A framework of wood" is formed, "which for excavating " operations may be mounted on wheels running on rails, and for " dredging operations may be as a floating raft." To the frame- work are affixed "a swing crane and platform, a scoop or bucket " of peculiar construction, a small boiler engine, wheelwork, and " winding barrel for coiling the chain around during the raising " of the implement employed for excavating or dredging, and a " stud wheel and chain for swinging and holding the jib of the " crane in any desired position."

"A slot" is formed "in the top part of the crane, about midway " between the post of the crane and the end of the jib thereof; " in this slot a spur wheel is placed, and revolves by an endless " chain passing over stud wheels respectively fixed on the axes of " the spur wheel, and the axis of another wheel situated near the

" platform of the crane. The spur wheel takes into a rack fixed " to a long piece of square timber, to the lower end of which is " fixed a sheet iron scoop formed with a moveable bottom. The " scoop is suspended from the end of the jib by a fork-shaped " piece of metal hinged to the sides of the scoop, said piece of " metal carrying at its upper end a pulley over which passes a " chain which proceeds from the winding-on barrel, through the " post of the crane, and over pullies attached to the top of the " jib."

[Printed, 1*s*. Drawings.]

A.D. 1859, June 3.—N° 1367.

KYLE, JOHN.—(*Provisional protection only.*)—" Improvements " in points for railways, and chairs for the same."

The invention consists " in forming the switch rails of double- " faced I rails, but in place of rounding off the inner sides of rail " heads," " it is preferred to form them at an angle to the vertical " sides of the rail, for the purpose of obtaining additional strength " and economy in the manufacture thereof."

" The switch rails are fitted into heel chairs of a suitable form " and secured therein by a vertical pin or rod passing up through " a hole in the rail, and upon which the rail works for a short " distance in a lateral direction."

" The chairs of the road rails which are within the range of the " switch rails are formed on their inner sides with a long, broad, " flat base, forming a bed on the top of the sleepers for the switch " rails to work upon, and the inner side of a portion of the chairs " of the road rail are cast with a projection on the side thereof, " which takes into the hollow side of the switch rail, and portions " of the switch rails are recessed to admit portions of the chairs " near their outer ends taking thereinto."

" Over the first sleepers in advance of the heel chairs each " switch rail is provided with a shoe or bracket chair or support " having a broad base, and which is secured to and moves with " the switch rails, which, with a transverse rod connecting the " outer ends of the switch rails, keep them securely in their " proper position."

" These improved switches are acted upon as follows :—A short " rod is attached to one side of one of the switch rails, and " extends through a hole formed through the side of the road " rail. To this rod a weight is attached by a chain or strap, or

" other mechanical equivalent, which works over a pulley mounted
" within a well or chamber formed in the ground so as to admit
" of the weight rising and falling therein. The opposite switch
" rail is also provided with a short horizontal lateral arm, which
" extends through an opening in the road rail, and is connected
" to the outer end of an horizontal lever of the first order, which
" works parallel to the surface of the earth." This long lever is
worked by the pointsman through chains or other levers."

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 4.—No 1379.

JAMES, CHRISTOPHER. "An improvement in the manufacture
" of railway chairs."

The object of this invention is to manufacture railway chairs of wrought iron of any of the ordinary forms now adopted for cast-iron chairs, by the combined use of cast-iron or other mould and hydraulic or other powerful pressure, in contradistinction to rolling pressure. The mould is fitted with a case, which is to form the seat of the chair. In the mould is placed a ball or lump of wrought or puddled bar iron, wrought to a welding heat, and by means of a ram or die actuated by hydraulic pressure, the soft iron is forced into the cavities of the mould, and thereby produces a chair in wrought-iron.

[Printed, 6*d*. Drawing.]

A.D. 1859, June 13.—No 1423.

CORLETT, HENRY LEE.—"Improvements in rails, and the
" permanent way of railways, parts of such improvements being
" applicable to common roads."

These improvements relate to "an improved joint chair, for
" bridge and other rails, having large bottom flanges;" a novel
" form and construction of rail; and to a method of laying rails
" combined with pavement, on common roads or streets."

"The improved joint chair may be either pinned down upon
" the sleeper," or "simply suspended from the rail between the
" sleepers." "As applied to the ordinary bridge rail, the rail
" bearing surface of the chair has a rib formed upon it, which fits
" into the hollow of the two rail ends, and serves to maintain them
" in proper lateral adjustment. The flanges of the rails are slipped
" under projecting lugs cast in one piece with the chair, and the

" rail ends are held down firmly on to the chair by metal wedges, " which are interposed between the upper surface of the flanges " of the rails and the under surface of the overhanging " lugs of " the chair, " such wedges being tightened up by means of one " or more screw bolts passed through the lugs . . . . and bearing " upon the outer edge of the wedges so as to force them inwards."

The "improved rail is intended to be laid with or without " sleepers, the earth in the latter case being simply banked firmly " up to it on either side. For this purpose two broad flanges " serve as "bearing surfaces for the rail;" and it is proposed "to " construct it in two parts rolled separately, and afterwards bolted " together longitudinally." The bearing surface for the wheels, " and supporting flange, is made considerably heavier than " the bearing flange for supporting the rail, although when laid in common roads "it might be used as a tramway for ordinary " vehicles. The junction flanges of the two halves of the rail " through which the bolts are passed which connect them together, " may be of a slightly bellied form, and a recess or channel is " formed in one, in which a corresponding part on the other fits " accurately. These flanges, when put together, will come in " contact at their outer edges and so form a firm and steady " junction."

The patentee also claims the use of a rail with cellular supports, into the cells of which various packings are introduced. A modification of this cellular system forms a pavement for turn-tables, crossings, &c.

[Printed, 1*s*. Drawing.]

A.D. 1859, June 16.—N° 1444.

BARROUX, Leon.—" A new system of railroad supported on " iron soles, with or without wood being used."

This invention consists in a method of constructing permanent way, in a different manner with existing materials, with the view to diminish the use of wood. A Vignole rail, for instance, is fitted with an iron sole.

"The connexion of the rail with the sole is obtained on the " inside of the rails, by an iron clasp rivetted on the sole; on the " outside, by a key grooved as it were into another clasp or hook " also rivetted on the sole, and which supports the action of " pressure. A small piece of sheet iron, the end of which, bent " down on the head of the key, prevents any loosening caused

" by the vibration of the railway. The rails are joined in the centre " of the length of the sole, at this point the inside clasp unites the " two extremities: on the outside a key or bolt at each extremity " seems better for the security of the several parts of the railway."

The gauge is preserved, and the cant of the rails given, by wooden sleepers at intervals, or by the use of angle iron instead.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1859, June 22.—N° 1498.

BUCKWELL, William.—(*Provisional protection only.*)—" Improvements in manufacturing materials for building and other " structural purposes, and of the machinery applied thereto, " which last invention is applicable to other purposes."

" First, in subjecting matter in moulds to pressure of impact, " by causing one or more rollers to pass quickly over it to compress or consolidate, and to make or form the required surface, " which may be plain, corrugated, surated, ridged, curved, " indented, or otherwise."

" Second, in forming paving, flooring, weirs, or other works, " as a structure more or less continuous, by subjecting the components of which it is desirable " it should be formed, to the " pressure of rollers."

" Third, in first forming moulds, so that any amount of pressure " may be applied independent of the mere weight of the rollers; " and, secondly, the forming of railways with adjusting fixing " pins, chairs, &c., for rollers to any required surface on the " ground, or in the place or position required."

[Printed, 4*d.* No Drawings.]

A.D. 1859, July 4.—N° 1591.

BROOMAN, Richard Archibald.—(*A communication from Job Johnson.*)—" A cementing powder or mixture, and process for " cementing, converting, refining, strengthening, and steelifying " iron."

The patentee says:—" I take quick or caustic lime, free from " earthy or foreign substances, and add to it an equal quantity of " bone dust," " and a like quantity of charcoal." " I then mix " these ingredients intimately, and expose them to the influence " of the weather for one, two, or more days, according to the " hygrometric condition of the atmosphere." " I then take any " *convenient form of* cementing or converting furnace;" " and

" commence by spreading a layer of the mixture on the bottom, " and interstratify the articles of iron to be operated upon with " the mixture till the furnace is charged, taking care to assort " the various articles, so as to insure the required uniformity of " treatment. I then close and lute with fire clay, so as to prevent access of air, and apply heat externally, testing from " time to time by means of trial pieces, which can be removed " at pleasure."

"Iron, subjected to this treatment, assumes great rigidity and " hardness without losing its property of malleability and ductility." "Railway bars, wheels, chains, anchors, anvils, and large " articles generally, may be hardened and strengthened to any " required extent."

[Printed, 4*d*. No Drawings.]

A.D. 1859, July 11.—N° 1649.

BURDEN, Francis.—(*Provisional protection only.*)—"Improvements in the permanent way of railways."

The invention consists "in constructing a continuous longitudinal metal sleeper, by bending together sides of trough iron, " and by rivetting or securing the rail in the jaws made by the " two sides when united. The broad base of the trough iron " will, in most cases, be sufficient to support the way without the " employment of transverse sleepers or blocks under the longitudinal sleepers, but in loose or sandy foundations the upright " pile hereafter mentioned may be driven at intervals under and " form a bearing for the base of the trough iron."

"Also in the construction of a way intended to be laid on loose " and sandy foundations. A hollow or solid cast or wrought-iron " pile or bar" is used, and provided "at bottom with a broad " screw or not. This pile may be used by itself as a support for " the trough iron sleepers before named as well as for other " descriptions of sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1859, July 12.—N° 1654.

WRIGHT, Thomas.—"Improvements in the permanent way " of railways, and in the means of preventing railway accidents " thereon."

The improvements consists, firstly, in employing "a rectangular " cast-iron bed plate sleeper, having the two longitudinal or rail-

"bearing surfaces and the transverse ties cast in one solid piece, with a timber or india-rubber trough cast on the top surface of the bearers, and a ballast fang on the under surface." A modification of this is a "rectangular casting, with the addition of a safety curb or rail projecting above the ordinary rails, upon which the engine runs. In conjunction with this safety curb is employed a 'life guard,'" "attached to the framing of the engine and carriages, and descends to within a short distance of the top of the safety curb." "On a break down occurring, or the train running off the rails, these guards and curbs support and confine the engine and train to the rails."

Thirdly, in "certain peculiar constructions and arrangements of cast-iron transverse joint sleepers." "The entire sleeper, with its transverse tie bar and rail-bearing bed plates" is cast in one solid piece, the intermediate bed plate sleepers being detached."

Fourthly, in "an improved 'vice-jaw' fastening, wherein the loose jaw, which is of wrought iron, is made to bear against the top and bottom of the rail."

Fifthly, "in constructing a double-headed flanged rail, which may be made to form either a rail and sleeper combined, or applied to transverse or longitudinal wooden sleepers. The joint clip to be used therewith consists of a trough made of rolled iron in one piece, or of boiler plate, which grips the under side of the rail ends. This clip, by increasing its width and length, may also be made to form a longitudinal wrought-iron sleeper, the rail being secured to its lateral flanges in the ordinary manner by pins or bolts, thus forming an entire wrought-iron permanent way."

Sixthly, in "certain improved combinations of rails or tramways to be laid in streets, railways, or roads." This improvement lies "in casting the rail and sleeper in one longitudinal piece. These combined rails and sleepers have single or double grooves or channels cast in their upper or wheel-bearing surfaces."

[*Printed*, 1*s*. 6*d*. Drawings.]

A.D. 1859, July 20.—Nº 1707.

CAITHNESS, JAMES, Earl of.—"Improvements in the permanent *way of railways*," namely:—

An improvement in switches "wherein a portion of one or both

" of the rails of the line are made to slide in parallel grooves or " slots."

The combination by means of rolls of a " T-shaped steel bar " with two wrought-iron L-shaped bars, in such manner as to " produce an I-shaped rail, with the steel rail in the centre, and " forming the wheel-bearing surface."

It is also proposed " to cover the wheel-bearing surface of the " ordinary double-headed rail with a layer of steel, by rolling the " rail in combination with a steel plate. . . . . Old or worn rails " may also be treated in this manner, thereby rendering them as " good as new again."

[Printed, 10*d*. Drawing.]

A.D. 1859, July 30.—N° 1773.

PARSONS, PERCEVAL MOSES. — " Improvements in switches " and crossings of railways."

In constructing switches according to this invention, " the " tongue rails are connected with the main rails by means of " brackets " attached to the rails on each side, " so as to form " joints on which the tongue rails turn, and the brackets resting " on the sleepers also serve to support the tongue rails." The point rail of crossings " is formed of cast steel or of cast iron, and " is combined with wing rails of steel;" the point and wing rails " are secured together by right and left-handed screws. The " wing rails " are made " of the ordinary double-headed form " except that opposite the point where the flanges of the wheels " do not come in contact with them, they are made square on the " inner edge of the table or head in place of being rounded off at " this edge as is usual; thus a greater surface is obtained to " support the wheels in passing the points."

Finally, the wing rails may be so arranged as to furnish a continuous bearing, " the weight of the train coming on the wing " rail causing it to move up to the point, if not already in this " position."

[Printed, 10*d*. Drawing.]

A.D. 1859, August 9.—N° 1847.

MACLELLAN, WALTER. — (*A communication from John Gregory.*) — " Improvements in part of the permanent way of " *railways.*"

The inventor claims the construction of sleepers "of a more or "less arched figure with open ends" and corrugated. The chair may, if preferred, be cast in one with the sleeper, and the latter may be strengthened by "flat iron tie bars or tension rods."

[Printed, 10*d*. Drawing.]

A.D. 1859, August 10.—Nº 1862.

CAPPER, GEORGE.—"Improvements in the permanent way of "railways."

A new method of connecting the rails together at or near their ends, and "consists of two pieces of wrought iron about "two feet long, the ends whereof are bent downwards and again "bent to the shape of the rail so as to form flanges or feet which "are intended to be fixed by trenails or screws to the sleepers of "the railway, one foot resting on one sleeper and the other foot "on another sleeper." It is proposed to "use two of these "wrought-iron plates at opposite sides of the rails, at their "points of junction, and connect them and the rails together by "bolts and nuts, the bolts passing through holes in the rails and "plates.

[Printed, 10*d*. Drawing.]

A.D. 1859, August 18.—Nº 1900.

CANU, ADOLPHE JOSEPH.—"Improvements in machines for "breaking or crushing stones, minerals, or other similar materials." For the ballasting of railroads."

The improvement consist "in providing such machines with a "series of cylinders or truncated cones of" suitable material, "revolving on their axes at high velocities in the same direction, "and striking with their surfaces against the materials to be "crushed, these surfaces being either smooth or fluted, corrugated, or provided with proper teeth or projections, in order "to throw the materials from the surface of one cylinder or cone "to that of another, while the axes of these latter are situated "in a vertical position at such distances apart as to form "a sort of grating with lateral openings, underneath which "cylinders a circular plate revolves horizontally." The materials to be broken are thrown on the grating, where they come in contact with the surfaces of the cylinders, and afterwards escape the required shape by machines. The rails are secured in these chairs by means of wooden keys or wedges, and the supports or chairs are secured to the bearings in any convenient manner. For railways or tramways of narrow guage, the chairs or supports for both rails may be made on the same bar of iron.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1859, September 13.—N° 2084.

ADAMS, WILLIAM BRIDGES. — "Improvements in the permanent way of railways."

"First, in spikes or screws for chairs, made with a square or " hole, or both, at the top to turn them round, and a washer of " metal in a conical nick to fit elastically a large-sided conical " hole in the chair."

" Secondly, metal keys as a substitute for wood keys, to secure " rails in chairs, which keys may be elastic to drive in without " splitting or damaging the chairs; the rail being suspended by " the upper table or support below, the sectional form of the keys " being various angles or curves, and they may be made with a " catch, or other methods of securing, and the keys may be on " one or both sides of the rail, and applied in combination with " wood, both for joints and for intermediates."

"Thirdly, improvements in" the patentee's "girder rails, " securing angle irons to the rails by key bolts, and using the " angle irons, so that both rails and angle irons, either of cast or " wrought iron, may be lightened in weight; and also girder " rails rolled in one piece, with their bearing flanges and improved joints to connect them, the rails having either one, two, " three, or four bearing surfaces; and also a mode of forming " cast-iron rails and cast-iron crossings so that they will not chip " at the joints."

" Fourthly, peculiar formed chairs of cast or wrought metal " to use with one or two keys, either to suspend or support the " rails, the peculiarity being in a notch or groove across one " or both jaws of the chair to keep the key or keys in position " vertically."

" Fifthly, improved key bolts . . . . being of sectional form to " give vertical and lateral strength, reducing the bolts in weight, " and being secured with a head and one key, or with two keys " *without* a head."

"Sixthly, improved cast-iron sleepers, with chairs cast on them "(*i.e.*), the chairs described under the fourth head, are expanded "into a base to dispense with timber-sleepers."

The inventor also claims the use of elastic packing "in order "to keep the bolts elastically tight."

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1859, September 16.—N° 2108.

LAUTH, Bernard.—"Improvements in the manufacture of "rails for railways."

The patentee says:—"The object of my invention is to increase "the strength of the metal of which the rails are formed, and "thus to enable them to withstand the wear and tear for a prolonged period. To effect this I submit them, when rolled into "shape by the ordinary method, and when in the cold state, to "pressure between rollers. The machinery for this purpose may "be somewhat similar to any usual rolling apparatus."

[Printed, 6*d*. Drawing.]

A.D. 1859, September 19.—N° 2124.

TAYLOR, Edward Henry.—"Improvements in the mode of "securing the bolts in fish-joint and other fastenings for rails on "railways."

One mode is by cutting a piece of sheet iron with slots in it to form prongs, corresponding with and filling up the space between each nut or bolt head, forming an additional skeleton fish plate, so that when it is driven downwards between the fish plate and the nuts, each prong will press against the sides (and tops) of the recessed part of the nuts and keep them perfectly wedged.

Another mode is by "making a flange of any suitable strength "at or near the top or bottom, or both top and bottom of the fish "plate, with a longitudinal groove below or above the flange, "according as it is placed at the top or bottom of the plate, and "a wedge" is passed "through the said groove, or one through "each of the grooves which projects and holds against the flange "and the inner side or recesses of the nuts or bolt heads, thus "holding them perfectly tight."

Also "in making on the side of the nut next to the fish joint ". . . . a notch or groove so as to intersect and bear upon the "*hole in the nut* through which the bolt passes, and in cutting

" away a portion of the bolt so as to form a flat surface corre-" sponding with the notch or groove in the nut when screwed up. " After the nut is screwed up there will thus be a recess or grove, " consisting partly of the groove in the nut, and partly of the " recess so cut in the bolt, and into this recess" is driven "down " a pin, cotter, or wedge, ... and thereby the nut is prevented " from turning and the bolt from becoming loose."

[Printed, 10*d*. Drawing.]

A.D. 1859, September 30.—Nº 2215.

BUCKHAM, Thomas.—(*Provisional protection only.*)—"Improvements in the switches for railways."

"This invention relates to the switches employed for guiding " railway trains and engines from one line of rails to another, and " consists in a novel mode of uniting the end of the tongue or " moving rail of such switches to the abutting rail of the line by " a system of hinges or jointed fish plates, instead of by a pin " passing through the rail and chair as heretofore. The straps of " the said hinges or jointed fish plates are securely bolted to the " body of the tongue rail on one side, and to the abutting rail on " the other, thus forming a hinged fish-joint, giving perfect stability and security to the tongue, and at the same time freedom " of movement, which is effected by the upper jaw of the hinge " joint acting as the centre or fulcrum on which the tongue turns " whilst the lower jaw has its hole (in which the joint pin fits) " slotted in the direction of motion."

[Printed, 4*d*. No Drawings.]

A.D. 1859, September 30.—Nº 2223.

COCHRANE, William Erskine.—"Improvements in chairs " and apparatus for receiving and securing the end of the rails of " railways."

"For these purposes in constructing chairs the inner surface of " one of the jaws of each chair is made to fit one side of the " rails; the inner surface of the other jaw is made with a horizontal groove and two vertical grooves, and there is a suitable " space between this jaw, which it is preferred should be upright, " and the surface of the rail to admit of a plate being slid down " between the jaw and the side of the rail, such plate having " thereon two ribs or projections suitable for entering the vertical "grooves in the inner surface of the jaw; or the grooves and ribs "or projections may be reversed by having the ribs or projections "on the jaw and the grooves in the plate.

"The horizontal groove is to receive a wedge or key to force up "the plate to the side of the rail."

The patentee describes this method as being "peculiarly suitable" to be used in joining rails under his former patent of 1856, No. 2681.

[Printed, 8*d*. Drawing.]

A.D. 1859, September 30.—Nº 2224.

EDWARDS, William Vaughan.—(*Provisional protection only.*) —"Improvements in the construction of ways and apparatus to "facilitate the conveyance of mails, goods, and passengers."

"For these purposes a tunnel or enclosed passage is con"structed with iron plates laid underneath or on the soil between "distant places, with arrangements for stopping at the terminal "and at intermediate stations to deliver and take mails, goods, "and passengers. At the lower part of such tunnel or enclosed "way two parallel rails" or trams "are formed, by preference, in "longitudinal grooves or recesses, or the rails" or trams "may "be dispensed with."

The air is exhausted in front of the carriages in order to propel them and to prevent friction of the atmosphere through any inconvenient length of the tunnel, "valves are placed at suitable "distances."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 1.—Nº 2226.

PARKIN, William, and BATES, James.—"Improvements in "wedges for railway chairs."

The wedges are made of cast iron or other metal, and each wedge is formed "with a slit or slot lengthwise, extending from "one end to nearly the other, in order to allow the wedge to "expand and contract."

"The slit or slot is formed to admit of a nut, the bolt of which "passes through a hole in the outer side of the wedge, so that "when the latter is inserted between the rail and the side of the "chair the nut can be placed in the slit or slot, and the bolt "passed through the hole and afterwards screwed up, so as to

" enlarge or expand the wedge to any required tightness, thus " securing it in the first instance, and afterwards tightening it, " as it may give way or become loose by wear and tear. A slotted " metal wedge" may be expanded "by driving a pin or key " between the sides of the slot, and thereby" forcing "the outer " sides of the wedges against the rail and chair."

[Printed, 6*d*. Drawing.]

A.D. 1859, October 8.—N° 2291.

IRLAM, William.—" Improvements in the construction of rail- " way turntables and cranes."

The patentee says:—" The first part of my invention consists " in certain improvements upon the turntables for which Letters " Patent were granted me A.D. 1856, N° 3065.

" The nature of my present improvements consists in making " the girders of such turntable platforms and the beams for con- " necting them, and for the centre pin, and the chairs for the rails " altogether of one solid piece of cast iron, thereby increasing the " strength, and economizing labour."

Another part " consists in making the chairs for the lower ring " to support the guard or catch ring and the planks or plates " forming the pit and the rails of the permanent way."

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1859, October 12.—N° 2326.

TAYLOR, Edward Henry.—(*Provisional protection only.*)— " Improvements in apparatus applicable to the permanent way of " railways."

The patentee says:—" To prevent the bolts used in fish joints " and chairs on railways from becoming loose by constant wear " and tear, I make a flange of any suitable strength on or near the " top of the fish plate having a longitudinal groove, so that I can " pass a sliding wedge through the said groove projecting against " the inner side of the nuts or bolts, which I form with suitable " recesses or grooves, thus holding them firmly and preventing " them moving by constant traffic."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 27.—N° 2456.

MICKLES, Philo D.—(*A communication from Danforth Johnson.*)—(*Provisional protection only.*)—" An automatic railroad " switch."

The invention consists in a switch so arranged that it is moved by the front wheels of an approaching train without reliance upon the attention of any one, and also that the train itself prevents its being displaced. "To the framework which supports " and carries the switch is connected a compound lever composed " of two levers of the first order, the other end of which compound " lever terminates in a broad or expanded part which lies between the inner rails of two converging tracks, and which is " acted upon by the flanges of the wheels, and thereby the switch " is operated."

[Printed, 6*d.* Drawing.]

A.D. 1859, October 27.—N° 2459.

ORDISH, Rowland Mason. — " Improvements in railway " *fastenings.*"

They consist "in constructing elastic metallic keys with one or " more surfaces roughened" or serrated, such roughenings or serrations fitting into corresponding roughenings or serrations, " formed upon the jaws or other parts of metallic chairs, clips, or " sleepers, or formed upon suitable pads, blocks, or keys. The " action of the elastic metallic keys is such that by forcing the " elastic keys or the pads, blocks, or keys into their required " positions, the elasticity of the material, as formed, enables the " roughenings or serrations "to pass or ride over the corre- " sponding" ones, and by the reaction "of the elastic keys, " the various parts are retained and secured in the required " positions."

[Printed, 10*d.* Drawing.]

A.D. 1859, October 28.—N° 2466.

GREAVES, Hugh.—" Improvements in constructing the per- " manent ways of railways, and in preparing parts thereof to " prevent oxidization."

The invention consists in an improved "longitudinal wood " sleeper road the object of which is to give a more efficient " bearing surface with a smaller amount of material than here- " tofore. For this purpose two longitudinal sleepers" are used " in combination with wrought or cast-iron chairs for supporting " each rail."

" In a new adaptation of Greaves' surface packed sleepers" by " the *employment* of two such sleepers of smaller dimensions,

" connected together by a wrought or cast-iron chair, or by a " piece of metal or wood on which the chair for supporting the " rail rests, instead of the single sleepers."

" In a new arrangement for securing tie bars."

In an improvement in chairs "constructed of cast iron," by " casting the jaws of the chairs or sleeper chairs hollow, thereby " giving greater strength with the same amount of material. The " improvements in moulding" them "consist in withdrawing " from the sand the whole of the two jaws at one movement, or " part of the jaw may be withdrawn first, and the other part " afterwards, and in producing the hollow print in the pattern " from which the top box or flask is moulded. The wrought-" iron chair is made from a piece of flat bar iron bent in a form to " receive the rail, and fastened by iron rivets to the sleeper.

" In heating sleeper chairs, and while so heated, dipping them " in a preparation of gas tar, petroleum, or other bituminous " material."

" And in a new form of cast-iron sleeper which may be cast " vertically, and which holds the rail by its own elasticity without " the intervention of wood keys; the gauge and angle of the rail " being maintained in the usual way."

[Printed, 10*d*. Drawing.]

A.D. 1859, November 15.—N° 2585.

WARD, William Henry.—" An improved turntable for rail-" ways, and other purposes."

" First, in supporting and centering the turning platform of " the table without the aid of the central pivot, by means of " hollow spherical balls, or spherical tread wheels arranged " between circular-grooved tracks, of such form in their cross " section as to admit freedom for said balls or wheels to turn."

" Second, in operating the table by means of a crank shaft and " gear wheel near the centre of the platform."

" Third, in supporting the ends of the track timbers by means " knee joints."

" Fourth, in operating the knee joints by means of a hand " lever near the crank shaft for convenience, while operating the " table."

[Printed, 6d. Drawing.]

A.D. 1859, December 6.—Nº 2757.

COIGNET, François.—" Improvements in the manufacture of " beton or composition applicable for purposes of covering, " building, and construction, and for various uses, as artificial " stone."

The materials are subject to a combined crushing, mixing, and pressing operation by machinery. Very little water is used, and the lime is brought into proper condition " by crushing it with " a very small quantity of water by forcible and sustained " mechanical means before adding any other ingredient."

The patentee says the improved betons " are applicable for " constructing sea walls, embankments, and other works exposed " to the waves, tunnels, monolyth surfaces and structures, turn- " table wells, and other railway works, ... telegraph wire " protectors, ... and many other purposes."

[Printed, 6*d*. No Drawings.]

A.D. 1859, December 14.—Nº 2840.

BENTLEY, Samuel, and STRINGER, John. — " Certain " improvements in railway chairs."

The invention consists in forming one side bearing on the base of the chair, and connecting the other by a hinge joint, " and " holding the two together for clipping the rail by a screw bolt " or bolts passing through them and the rail; . . . . by this " arrangement the rail may be removed for the better adjustment, " or to reverse it, or for any other purpose. When using these " chairs for receiving the two ends of rails, two bolts and screws " are used, " one to pass through the end of each rail, but for " intermediate ones one screw bolt will be found sufficient. In " manufacturing these chairs from wrought iron," it is purposed to bend " them into the desired shape in a hot state by suitable " tools; nevertheless they may be cast in the ordinary way."

[Printed, 8*d*. Drawing.]

A.D. 1859, December 17.—Nº 2879.

CLARK, William.—(*A communication from Auguste Desgoffe and Leon Jucqueau.*)—" Improvements in the supports or chairs " of railway rails."

"The improvements are equally applicable to joint or ordinary " *chairs. They may be* used without the intervention of fixed

" holding wedges or bolts, avoiding injury to the ends of the " rails by piercing or otherwise, as also all drawing of the " dowels, and consequently produces a saving in the wear of " the sleepers. In these improved arrangements of bearings the " weight of a train is utilized to produce the lateral binding of " the rail."

The jaws of the chair are loose, and when the rail is pressed by the train, they close on the rail and grasp it. One jaw may be moveable, and one fixed, or both may be moveable.

[Printed, 8*d*. Drawings.]

A.D 1859, December 21.—N° 2912.

ABBOTT, William.—(*A communication from James Campbell Francis Calvert.*)—(*Provisional protection only.*)—" An improved " method of preserving timber, particularly adapted for railway " purposes."

"The timber which, in preference is to be the 'pitch pine,' or " other timber containing resinous matter, is to be cut the desired " length and size, and then subjected to heat, ... which has " the effect of bringing a portion of the resinous matter to the " surface, and forming a hard coat or crust, at the same time " drying the sap within the wood, thereby adding to its strength, " and preventing any absorption of moisture."

"This process being well adapted for railway sleepers, telegraph " posts, and all building purposes."

[Printed, 4*d*. No Drawings.]

A.D. 1859, December 27.—N° 2950.

TRUSS, Thomas Seaville.—" Improvements in the mode of " packing or cushioning railway chairs, pillars, pipes, girders, " and engines, by the use of animal and vegetable fibre packing " chemically prepared."

The improvements consist in preparations of fibres to be used to prevent or lessen concussion or jar, " when applied to railway " chairs, pillars, girders, engines, or other machines, and to make " water and air-tight joints when used to secure the joints of " pipes.

" The animal fibres " chiefly used " are wool, cow hair, and dog " hair; the vegetable fibres which " are chiefly used " are hemp, " *flax, and cotton*. The chemical preparation to which " they are submitted "to protect them from the action of the acids or "gases is steeping them or passing them through an alkaline "solution or otherwise coating or filling them with alkalines, "and afterwards, or at the same time, coating them with cold or "hot grease, pitch, or tar, or these substances combined; the "alkalines" employed "are potash and soda, and for most purposes, in the proportion of about one part alkaline to four "parts water."

[Printed, 4d. No Drawings.]

A.D. 1859, December 31.—Nº 2996.

GIBSON, Robert.—"Improvements in the permanent way of "railways, and in the manufacture of parts of the same."

"First, in securing wooden keys in railway chairs:—On one "side of the wooden key" is formed "a groove in which is "inserted a piece of iron enlarged or bent at one end; when the "key is driven home a nail or screw may be inserted through "the piece of iron into the wooden key after the iron key or "wedge is driven close up to the chair; this will prevent the "wedge from receding, and in case the wooden key requires to "be tightened up, the iron wedge may be again driven home "against the chair, and a fresh nail or screw driven in. The projection on the iron key may be inserted in a hole made in the "chair or in the rail, and when the wooden key is driven home "the nail or screw may be put in, in order to prevent the wooden "key from receding; or, instead of a nail or screw being driven "through the hole in the iron key, and into the wooden one, the "end of the iron key may be elongated beyond the large end of "the wooden key, and bent for the purpose of retaining the "wooden key; and so often as the latter may be driven home, so "often may the bending of the iron key take place."

Other methods or modifications of this plan are described.

The second part consists "in forming the chairs of wrought "iron by stamping in suitably formed dies." Bar iron is bent "so that its ends may form the jaws of the chair;" and it is heated to a welding heat and then inserted between the jaws of a suitably-formed mandril, and then the whole is placed into a properly shaped die, and stamped into the proper shape, and the necessary bolt holes are punched at the same time; or, "instead "of bending the bar so as to form the jaws of the chair, loose

" pieces of a suitable form and weight may be laid on to the " bottom bar, and the entire mass welded as before."

[Printed, 1*s*. Drawings.]

1860.

A.D. 1860, January 3.—N° 10.

HORRIDGE, John.—" An improved iron wheelway for streets " and roads."

The invention consists in a wheelway formed by the " arch of " a circle of so large a radius that, whilst it compels the wheel " rolling over it to a linear friction, it will permit it to roll in a " straight direction." " An iron plate of the requisite width " is bent " to the desired convexity by passing it sideways between " bending rollers. . . . . On to each corner of the plate " is welded " a lappet of iron with a hole punched through it or a " staple. The lappet or the staple bend downwards at a right " angle with the cord of the arch of the iron plate, so that when " the convex plate is placed on the coping, the holes of the lappet " or the staple will fall opposite to horizontal holes " " through " the coping of brick or stone." Then the plate is tied firmly to the coping.

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 5.—N° 30.

NEWTON, Alfred Vincent.—(*A communication from Benjamin A. Mason.*)—" An improved mode of and apparatus for fitting the " abutting ends of the rails of railways together."

The object is to cut the ends of T-rails, so as to form a kind of rebate or lap joint. The rail to be cut is mounted on a carriage, which is moved forward by a screw shaft, till it brings the end of the rail up to reciprocating cutters.

[Printed, 10*d*. Drawing.]

A.D. 1860, January 5.—N° 31.

CHAMBERS, Austin.—" Improvements in the mode of working " junction signals on railways."

The invention consists in making use " of any suitable arrange- " *ment of stops* or checks connected with the levers, whereby

" the points made use of for turning trains out of the main line " into a branch, or vice versa, are moved. These stops are so " arranged that when the points are set for trains running on " the main line, to continue thereon past the point at which " another or branch line enters it, the signals referring to communication with the branch line will of necessity stand in the " position indicating 'danger,' and (by reason of the stops) " cannot even commence being moved from that position until " the contrary or main line signals have first been caused to " assume the 'danger' position, after which the points may be " moved, and the act of moving them (the points) will cause " the main line signals to become locked and to remain immovably fixed, indicating 'danger,' until the contrary signal has " been placed again in the danger position, in which it will be " locked as before by the act of moving the points back to their " original position; the act of moving the points invariably " locking the one signal or set of signals in the 'danger' position, and leaving the other signal or set of signals at liberty " either to be placed in the position indicative of safety, or to continue in the danger position."

[Printed, 10*d*. Drawing.]

A.D. 1860, January 18.—N° 132.

KREEFT, Siegerich Christopher.—(*A communication from Carl von Etzel.*)—(*Provisional protection only.*)—" Improvements " in the permanent way of railways."

The invention consists "in constructing the transverse sleepers " of trough iron, which, when inverted so as to have its concave " surface towards the earth, and well packed beneath will form a " very stable and secure foundation for the rails. When T or " bridge rails are employed with these improved transverse " sleepers the rails may be bolted thereto direct without the use " of chairs." By employing these sleepers the necessity for tie " bars to preserve the gauge of the rails is avoided.

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 28.—N° 221.

DUNN, Thomas.—" Improvements in machinery and apparatus " for altering the position of locomotive engines and carriages, " and for preventing injury and accidents on railways."

No adequate description of this Patent can be given in a mere abstract, the patentee having filed 41 Sheets of Drawings, and made 55 distinct claims, which are as follows:—

First, constructing the sides of railway traversers.

"Secondly, the application of various descriptions of rolled "iron, such as T, H, Z, and beam iron for making the sides, "ends, and cross bars of railway traversers, and angle iron, when "made of sufficient strength to form the rail for wheels of the "carriage, and deep enough to form one side of the traverser."

Thirdly, "constructing the bodies of traversers of steel or "homogeneous or wrought-iron plates."

"Fourthly, the application of strips or belts of vulcanized "india-rubber or other suitable yielding material between the "guide rails and low shelving of traversers, and to the platforms "of turntables."

"Fifthly, the placing of all the cross tram rails for the traverser "on the same level as the rails of the permanent way."

"Sixthly, improved modes for supporting the cross tram rails, "and connecting them to the rails of the permanent way."

"Seventhly, supporting the flanged guide rollers of railway "traversers in levers or in bearings acted upon by springs or in "sliding bearings, for the purpose of enabling the flanges of the "said rollers to rise and pass over the rails of the permanent "way."

"Eighthly, the application of the slides or skids, for the "purpose of guiding the traverser on the cross tram rails, whereby "the supporting rollers and the cross rails may be made without "flanges."

"Ninthly," constructing traversers, "having elastic points "formed of continuations of the steel or homogenous sheet iron "sides, whereby the carriage to be moved is supported by the "flanges of its wheels."

"Tenthly, self-acting points for traversers, and the hinging of "points to traversers in such wise that they will shut up or close "on coming in contact with any obstacle."

"Eleventhly," "self-acting points for traversers."

"Twelfthly, the application of self-acting points" "to plate "and pit traversers."

"Thirteenthly," the construction and arrangement of traversers "*whereby* the incline for the carriage wheels to run up is pro"*duced by* depressing one end of the traverser."

"Fourteenthly, the application of platforms to traversers for
" supporting the gearing, and the men by which the traverser is
" moved along the cross tram rails."

"Fifteenthly, the general arrangement and improved construc-
" tion of pit traversers."

"Sixteenthly, the various improved modes of constructing the
" cross tram rails of traversers with steel bearing surfaces."

"Seventeenthly, the application of guards or projections to the
" cross tram rails for traversers."

"Eighteenthly, the general arrangement of plate traversers and
" the improved modes of connecting the plates."

"Nineteenthly, the general arrangement of frame traversers
" and the improved mode of staying or connecting the sides, ends
" and cross bars."

"Twentiethly, improved modes of constructing the curbs of
" railway turntables."

"Twenty-firstly, improved modes of supporting the curb and
" curb ring."

"Twenty-secondly, supporting the rollers for the platforms of
" turntables in a double beam or in boxes forming part of the
" curb."

"Twenty-thirdly, improvements in the construction of the
" platforms of turntables."

"Twenty-fourthly, improved modes of constructing the curbs
" and platforms of turntables."

"Twenty-fifthly, supporting the rollers for the platforms of
" turntables on studs fixed to the curb."

"Twenty-sixthly, the application of steel rings to the under side
" of the platforms, which rings bear on the supporting rollers."

"Twenty-seventhly, the case-hardening or the application of
" steel to the circumference of the supporting rollers of traversers
" and turntables."

"Twenty-eighthly, the application of vulcanised india-rubber
" or other yielding material, to the rollers of traversers and
" turntables, to prevent or diminish noise and concussion."

"Twenty-ninthly, the casting the rollers for traversers and
" turntables of cast steel or homogeneous iron."

"Thirtiethly, the general arrangement of the turntables,"
shown.

"Thirty-firstly, the arrangement of turntables shown" and
" *modes of connecting* the plates of the platforms."

"Thirty-secondly, the general arrangement of the turntables," shown.

"Thirty-thirdly, the combination of parts for steadying the " platforms of turntables."

"Thirty-fourthly, the general arrangement of the turn-tables " and the double ring for the bearings of the supporting rollers."

"Thirty-fifthly, the general arrangement of turntables shown," and "the application of double or treble headed deep bar iron to " form the rails and beams."

"Thirty-sixthly, the general arrangement and improved mode " of constructing turntables."

"Thirty-seventhly, the casting the cross rails for railway turn- " tables of cast steel, tough or homogeneous iron."

"Thirty-eighthly, the improved beams for turntables and the " application of steel to the rails of the platform."

"Thirty-ninthly," "the particular mode of constructing and " securing the beams of the platform."

"Fortiethly, the general arrangement of turntable, shown in " combination with " the "improvements in connecting the plates " of the platform, and dividing the platform in two or more parts " to facilitate transport."

"Forty-firstly, the application of ratchet wheels to the rollers " of traversers, and the combination of levers for working them."

"Forty-secondly, the forming the platforms of turntables of a " centre beam, either in one piece or connected in the centre of " its length, and combining therewith brackets or cross bearers " for supporting rollers and rails."

"Forty-thirdly, the improved mode of constructing the plat- " form."

"Forty-fourthly, the application of vulcanized india-rubber or " other suitable material to the wedge bars of certain turn- " tables."

"Forty-fifthly," an "improved arrangement of switches or " points."

"Forty-sixthly, improved arrangements of switches or points " and crossings."

"Forty-seventhly, improved arrangements of switches."

"Forty-eighthly, the making the switches," and "that portion " of the rails over which the rails of the crossings pass of " *steel.*"

"Forty-ninthly, the application of portable points and crossings "to railways, which can be laid down and applied to any part of "the line, and afterwards removed without in any way disturbing "the rails of the permanent way."

"Fiftiethly, the application of platforms with moveable points, "and with rollers running on cross tram rails in constructing "portable crossings, as shewn and described."

"Fifty-firstly, the application of" certain "rails, and the chairs "and sleepers in which or to which they are affixed, when used "in combination with machinery or apparatus for preventing "injury or accidents on railways."

"Fifty-secondly," certain "improved clips or slides, when used "in the manner and for the purpose described."

"Fifty-thirdly, the mode of applying rollers to the rails of "railways."

"Fifty-fourthly," the application of rollers and fenders or guards "to the wheels of railway carriages."

"And, lastly, the improved combination of machinery, shown "and described, for bringing the clips or slides in contact with "the rails."

[Printed, 11s. 10*d*. Drawings.]

A.D. 1860, January 28.—N° 222.

JOHNSON, John Henry.—(*A communication from François Auguste Dufey.*)—"Improvements in the steeling and cementation "of metals."

The invention consists in "a simple and economic mode of "steeling or cementing metals, and of improving the quality of "inferior steel, and effecting such processes by the vaporization "resulting from the boiling of a combination of animal, vegetable, "and mineral substances, into which vapour the metal to "be treated is to be immersed. This vaporization is prepared "by combining . . . . the following ingredients in the "following proportions :—

Grease - - - - -	500	parts by weight.
Oil - - - - -	500	"
Charcoal - - - -	350	"
Prussiate of potash - -	250	"
Horn - - - - -	330	"
Saltpetre - - - -	300	"

" By the above mixture the cementation of cast iron of all kinds
" may be obtained in a few minutes. The same system is equally
" applicable to the hardening of various parts of machinery or
" tools, whether of wrought or cast iron, and to the hardening
" of the rails of permanent way of railways, and the wheels,
" springs, and other portions of the rolling stock."

[Printed, 4*d.* No Drawings.]

A.D. 1860, February 8.—N° 334.

MOODY, Charles Peters.—(*Provisional protection only.*)—
" Improvements in carrying, supporting, and shifting engines
" used in ploughing and other agricultural operations, and in
" apparatus employed therein."

The patentee says:—" At both ends of a field or space over
" which an engine is to travel and draw at its side ploughs"
" or other implements, I lay down a platform along which the
" sleepers and rails for supporting the engine are to be drawn or
" traversed. The platform itself is drawn along after the engine
" has left the rails, which it supports by winding up a rope at-
" tached to an anchor," "or otherwise. Between the two
" traversing platforms I lay down a portable railway. . . . .
" I either shift each length separately laterally across the field, or
" I move the whole railway or three or more lengths when joined
" together, by the following contrivance:—"To the two lengths
" farthest from the centre I connect one end of two cords, and I
" lead each of the cords through a pulley supported by an anchor
" placed for the purpose. I carry on the cords through a block
" secured and held in place by another anchor in which there are
" two pulleys; each of the before-named cords is passed round
" one of the pulleys, and both cords are carried back towards
" the apparatus; they may be united in one, or may be carried
" on together, and attached to the barrel of a windlass projecting
" from the side framing of the railway about the centre. On
" power being applied to turn the windlass, all the parts con-
" nected as aforesaid, and to which the cords are attached, will
" simultaneously and as one body be drawn laterally."

[Printed, 4*d.* No Drawings.]

A.D. 1860, February 8.—N° 343.

NEWTON, William Edward.—(*A communication from George Willard Reed Bayley.*)—" Improvements in rails, rail supports,

" and fastenings, and the nut fastenings of rail bolts for the permanent way of railroads."

First, "in a peculiarly formed reversible rail," called "the reversible Z rail; with this rail is combined the double-headed with the flat-footed rail, being flat-footed one side and double-headed the other side."

Second, in "supporting, bracing, and giving an artificial bearing to railway rails, particularly the Z rail, at the intermediate cross ties between the joints, or at the joints themselves, so as to obtain at such points on the cross ties any desired width of rail base, without adding to the weight of the rail, and without using bolts."

Third, in a "novel method of securing the joints of rails by means of brackets and fishing bars, and at the same time securing the rail brackets and fishing bars down to the sleepers, dispensing with the ordinary screw bolts," "while the parts forming the rail will be rendered more substantial and less liable to injury or to come loose by the passing of the trains over the rail."

Fourth, "in a novel method of securing the rail joints by bolts, and in preventing them from working loose in consequence of the" passing of the trains. For effecting this a "suitable wedge or nut guard" is employed, "which, when these nuts are tightened up, is placed under them in a such a manner as to form a perfect lock, and prevent them from getting loose" by the passing of the train over the rail.

Fifth, in "forming a rail spike head of a peculiar shape," having in the back "a supplementary lip for allowing the insertion under it of an edged crowbar for drawing out the spike," the head being "so formed that it will keep the nut guards in place, and securely lock them under the nuts of the rail bolts where nut bolts are used, and" so that "the head of the spikes will fit bevilled-shaped recesses in the nut fastenings and brackets or brace bearing, and not only keep them in place, but prevent them from tilting or moving."

[Printed, 2*s*. Drawings.]

A.D. 1860, February 10.—N° 356.

RAMMELL, THOMAS WEBSTER.—"Improvements in pneumatic railways and tubes."

"This invention is for an improved pneumatic railway.
" The railway is placed in a hollow way or tunnel, which may be
" of any shape, but will be most conveniently made of the same
" shape in transverse section as the carriages employed, and in
" size very little larger than such carriages. The carriages are
" entirely supported, and in their motion directed by the iron
" rails, grooves, or trams constituting the way. The carriage
" underneath is boxed or framed out in one or more places to the
" shape and nearly to the size of the tunnel, and the same con-
" trivance must be adopted in cases where the body of the
" carriage is not of the same shape and nearly of the same size
" as the tunnel. A soft material is introduced to fill up the
" narrow space left between the carriages and the casing of the
" tunnel, and is affixed to and moves along with one or more of
" the carriages, by which means leakage of air is in great measure
" prevented during the working, or in cases where the leakage is
" inconsiderable this may be dispensed with. The pneumatic
" pressure is applied over the entire transverse area of the car-
" riages, either by exhaustion or compression, the pumps or other
" apparatus for the purpose being worked by steam power, and
" proper valves and air passages being provided."

"A railway may be either single or double, each line having its
" own tunnel or hollow way, and may consist of one section only,
" or of many sections, which may be worked concertedly, so as to
" pass the traffic on from end to end, with stoppages for taking
" up and setting down at every station. The railways may be
" used for the conveyance of passengers or goods, or upon a
" smaller scale of any size desired, for the conveyance of parcels,
letters, and the like through a tube, in which case the rails or
" grooves guiding and directing the motion of the carriage may
" or may not be part of the body of the tube, as desired."

[Printed, 10*d*. Drawing.]

A.D. 1860, February 11.—Nº 377.

NEWTON, Alfred Vincent.—(*A communication from George Smith Avery.*)—" An improved construction of joints for railway
" bars, or rails."

The invention consists in " the construction of the joints " by
" *offsetting* or bending the end of one rail, and lapping the end
" *of the* next one alongside of it as far as it is offset, and riveting

" or bolting the two lapping portions together, with or without a " key of wood or iron, in the space between the necks of the rails " where they are lapped."

[Printed, 8d. Drawing.]

A.D. 1860, February 23.—N° 487.

BARLOW, Thomas.—(*Provisional protection only.*)—"A new " or improved rail for railways."

"On either side of the body of the rail, and midway between " the two heads of the rail, is a flange running the whole length " of the rail. The said flanges constitute a plate situated in a " plane at right angles to that in which the body of the rail is " situated, the said plate being about seven inches in breadth. " In laying" this "rail the said plate or flanges are placed upon " sleepers situated on either side the line of rail, the said " flanges being secured to the sleepers by bolts or otherwise; " when one of the heads of the rail is worn, the rail is turned so " as to bring the other head into use. As the rail is supported " on the flanges the height of the rail when turned is not affected " by the worn head of the rail which is undermost."

[Printed, 4d. No Drawings.]

A.D. 1860, March 8.—N° 628.

GODDARD, William.—(*Provisional protection only.*)—"An " improvement in railway chairs."

"The chair is cast in two parts, the outer jaw and base being " in one piece, and the inside jaw loose and fastened to the other " part by means of a bolt with a square neck and snap head " passing through the rail and both jaws of the chair. The loose " piece is also steadied by a projection or lug at the bottom of " it, which fits into the base of the chair, and forms a shoulder " or abutment. The rail is suspended on the top of the chair, " which fits to the underside of the top flange of the rail, and " also by means of the bolt. The bottom flange of the rail by " this combination is prevented from coming in contact with the " base of the chair, and the rail can be reversed."

[Printed, 4d. No Drawings.]

A.D. 1860, March 13.—N° 671.

NEWTON, William Edward.—(*A communication from William Wharton, junior.*)—" Improvements in railway tracks and carriage " *wheels.*"

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"The object of this invention of improvements in railway tracks "and carriage wheels is to allow one or more of a series of trains "that run over a common railway to pass the switches or other "appliances that may be used at the intersections of branch ways "with the common or main railway without being interfered "with or turned out of their proper way by such switches."

"Also to arrange at the crossings or intersections on railways "a switch, turn-out, or appliance in such a way that each train, "although allowed without interference to pass the switches, "turn-outs, or other appliances at the intersections of the branch "way used by other trains will be allowed to pass on its "own track way without the aid of switches or any appliance "requiring manual adjustment at such crossing, but will be "switched or turned out of the main line into its proper branch "when it arrives there."

The wheels have several treads and the track is provided with "elevated or bridge rails and guard rails" at the "inner section "of turnouts or branch tracks."

[Printed, 10*d*. Drawing.]

A.D. 1860, March 15.—N° 690.

LAUTH, BERNARD.—(*A communication from John Fritz.*)—(*Provisional protection only.*)—"Improvements in machinery or apparatus for rolling railroad rails, bars, beams, and other such "articles."

"This invention consists in so arranging three high rolls that "the article shall be subjected to the rolls in each of its passes "to and fro, and so that each pass shall roll down the fin formed "at the preceding pass, and avoid the turning of the rail, bar, "or beam."

"And, in combining with the top roll of the series, or with the "roll that performs its part of the operation, elastic or yielding "guides, or their equivalents, for causing the bar, beam, or rail "to pass from the said roll, and not wind around it."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 16.—N° 696.

SAYER, ROBERT BURGES.—"Improvements in parts of the "*permanent* way of railways."

The patentee says: — "I propose to make railway chairs "(adapted) for joint and intermediate chairing on railways "constructed with cross sleepers and double or single tee-headed "rails."

"My chairs will be made in two parts, tongued together with "circular joints and keyed together in the bottom thereof with "plates of wrought iron." "The inside end of plate will have an "inclined plane, and snugs will be made on the bottom of the "chairs, fitting into slots in the bottom plate, so that the fang "bolt fastenings will alone draw the whole together perfectly "rigid and firm, dispensing with the use of keys, plugs, or other "fastenings."

"I propose to make the joint chairs about eleven inches in "length with a wrought iron (or other metal) cross fillet cast in "the centre of the chair, which will form a perfect fish joint. "The rails will be supported on the bottom and under the top "head of the rail by the chairs."

[Printed, 10*d*. Drawing.]

A.D. 1860, March 20.—N° 727.

FINCH, Edward.—(*Provisional protection only.*)—"Improve"ments in constructing railway switches and crossings."

This invention is "applicable to railways constructed across or "along roads and ways where carriages with wheels having "ordinary tyres are used, and are required to be allowed to pass "freely across such railway. For these purposes, where the rails "used in constructing the railway are hollow, and somewhat "similar in section to inverted 'bridge rails,' and where the "flanges of the railway carriages run in the hollows or grooves of "the rails," these are applied "in combination with such inverted "or hollow rails, switches and crossings constructed in like "manner to the switches and crossings on broad gauge and other "railways, where bridge rails are used in constructing the per"manent ways."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 20.—N° 990.

ROBERTS, Richard.—"Improvements in punching machines."

The invention consists "in certain improved combinations of "*eccentrics or other* equivalent agents, with dies and punches "for punching, either simultaneously or otherwise, both webs "of L, T, and other shaped bars of iron and other metal; and" also "in the application of self-acting mechanism for advancing "the said bars previous to and for holding them whilst being "punched, whereby greater accuracy will be attained than is "practicable by the present methods."

"The instrument by which the angle or other shaped bar to be "punched is held down during the operation of punching, is "worked by a cam acting on the weighted lever or other suitable "mechanism, previous to advancing the carriage or carriages to "which the bar under operation is secured. The mechanism for "advancing the carriage or carriages and bar consists of a toothed "rack, connected to the carriage, acted upon at each stroke "of the machine by a pall or click, actuated by a cam or other "equivalent agent."

The carriage runs on a railway.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, April 20.—N° 997.

WALKER, JAMES.—(*Provisional protection only.*)—"Improvements in railway sleepers."

"These improvements consist in making the sleepers for rail"ways of plates of wrought or cast iron, bolted or rivetted to "a stretcher piece of angle or T iron, or iron of other suitable "section."

[Printed, 4*d.* No Drawings.]

A.D. 1860, April 21.—N° 1006.

WALKER, JAMES.—(*Provisional protection only.*)—"Improvements in railway points or switches, and also in the keys for "securing the rails in chairs of railways."

The improvements in points or switches consist "in avoiding "the tapering of the tongue rail, using an ordinary parallel-sided "rail, and making a portion of the side rail moveable."

"The improvements in keys for securing the rails in the chairs" consist "in making them either of iron or wood, but of such "thickness as to admit of the key being dropped in between the "upper flange of the rail and the jaw of the chair, a projection or "lug being formed on each end of the key, so as to prevent it "from moving endwise when placed in the chair. One or more

" iron or wooden wedges or packings are then to be driven in a " vertical direction between the key and the jaw of the chair, so " as to secure the whole."

"As a modification of the above, the projections on the key " may be made only sufficiently large to clip the wedge; in which " case the wedges must be formed with projections so as to clip " the chair.

[Printed, 6*d*. No Drawings.]

A.D. 1860, April 24.—N° 1022.

GATWOOD, EDWARD.—" Improvements in fixing and securing " the rails in cast-iron or other chairs at joints and intermediate " places in permanent ways."

In securing the rails at the joints, by "a plate of cast or " wrought iron of sufficient length to take the ends of both " rails," and "made to fit any section of rail on one side, the " other side of the plate to have one or more recesses." "A " wood or any other key" is placed "with a projection, to fit " in this recess or recesses; this key on the opposite side must " have a groove or notch to take the projecting part of an iron " or any other wedge driven in between the wood key and the " jaw of the chair," to prevent the "iron plate and wood key " from working out or getting loose, and to accomplish this, " when the iron wedge is driven in sufficiently tight, the end " must be bent back against the side of the chair and fixed."

[Printed, 10*d*. Drawing.]

A.D. 1860, April 25.—N° 1040.

TARTE, XAVIER, and TOOVEY, WILLIAM.—" Improvements " in the construction of floorings and roofings, and other parts " of buildings and other structures, which improvements are " also applicable to the construction of bridges and other " works."

The object is "to obtain lightness and strength in the con- " struction of parts of buildings and other structures, and to " render such parts fireproof." "For these purposes, light " framings" are formed "of wrought metal, which are covered " on the upper, and if desired, lower sides with plates of sheet " metal, the whole being united together" by suitable bolts. " *When for floorings,* the upper surface of these constructions

" may be covered with wood or any other suitable material, and " the under surface with lath and plaster to form a ceiling."

"Sometimes the surfaces are formed by means of plates laid in " angular channels, and connected together across the upper and " lower angles by transverse straps or plates, or by the aid of " blocks of wood when for roofing."

The patentee says :—"The system described can be applied in " the most advantageous manner not only to ordinary buildings, " but to foundations of all works, as platforms or coffer dams, " to the construction of bridges; to hydraulic works, as ground " frames; to syphons; to vaults, arches for roofs of churches, " and all public edifices of whatever form; to the construction of " tunnels; and to railways, viaducts, &c."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1860, April 26.—N° 1051.

TRAIN, George Francis.—"Improved system of railway or " tramway to be used with horses or other power, and passenger " carriages for the same."

"The improved form of rail intended to be used in the con" struction of the combined tramway and railway" is preferred to be "of rolled iron bars of any convenient length, and say from " three to six inches broad, the upper surface of which" is formed "on the outer side with a ridge of from about half an " inch to one inch elevation, with a flat or slightly rounded crown " of about one and a half inches broad, and which is vertical on " the outside, and worked off into a round and hollow in the " inner side, leaving a lower flat or nearly flat surface of from one " and a half to two and three-quarters inches wide. The under " surface of the rail" is formed "with a feather or flanch on each " side, to assist in keeping it in position on the longitudinal " stringers of timber upon which they are to be laid. The rails " are secured to the longitudinal stringers upon which they are " laid by spikes or bolts, the heads of which are countersunk in " the upper surface of the thin flat part of the rail. The stringers " are kept parallel to each other by the use of transverse wood " sleepers or iron tie rods, as is well understood."

The joints are made good by iron plates let into the stringers and the road between the rails is as usual.

[*Printed*, 8*d*. Drawings.]

A.D. 1860, April 30.—N° 1085.

MASURE, Georges.—" Improvements in the construction of " railway crossings."

The invention consists in " constructing and arranging this " part of the permanent way so that there may be no danger of " a through train being thrown off, or improperly diverted from " the line at points where such improved crossings are placed. " With " the " improved crossing the through line is not in any " way interfered with or divided, as is now the case, in order to " enable the flanges of the wheels of the carriages to pass across " the main line, to do which, according to the present system, the " rails of the line must be divided at different places, and thereby " weakened, and the continuity of the line destroyed. Instead " of this the rails of the crossing " are made " higher than the " main rails at all points where they cross the main line, so that a " flanged wheel in passing over the crossing, will be raised up " above the main line, and the flange will be allowed to pass over " the same. This is effected by making the rails of the crossing " on an incline up to the main line, then giving them an inclination in the opposite direction after passing over the main line " until they arrive at a proper level."

[Printed, 8*d*. Drawings.]

A.D. 1860, April 30.—N° 1091.

HUGHES, Edward Thomas.—(*A communication from Pierre Irénée Leys.*)—" Improvements in joining or connecting rails of " railways."

"The ends of the rails are jointed together without splits or " fish joints, by forming each end with a tenon or wedge, and " also with a mortice or groove, the projection on one end of the " rail fitting into the mortice or groove in the next or following " rail."

[Printed, 1*s*. Drawings.]

A.D. 1860, May 9.—N° 1142.

KEMP, Henry.—" Improvements in preserving wood, leather, " iron, and other substances."

In preserving wood generally, as timber for buildings, bridges, *railway sleepers, and* various other purposes, equal proportions of peat tar and wood tar are taken, to which are added in proportions peat oil and methylated spirit, and also in some cases sulphate of iron, and arsenic, sufficient to poison the mass so as to render the composition destructive to animal and vegetable life.

The wood is punctured, and placed in a vacuum chamber for refrigeration.

The compound is modified for other substances.

[Printed, 4*d.* No Drawings.]

A.D. 1860, May 29.—N° 1324.

HEINDRYCKX, Floride.—" Improvements in the construc-
" tion of railway chairs."

The object of this invention is, " to construct railway chairs in
" such a manner as to enable engineers to dispense with the use
" of the wooden quoins or wedges which are usually employed
" for securing the rails in their chairs."

" The chairs are made from bar iron or steel, bent up in a suit-
" able manner to form a lateral abutment for the side of the rail
" to fit or bear against, while the footing of the rail rests upon
" the horizontal part of the chair. The chair is secured down to
" wooden or other cross sleepers, by means of bolts or spikes in
" the ordinary manner; or two of" the "improved chairs may
" be formed on the ends of one bar of iron or steel, which, when
" properly secured to the ground, will ensure the maintenance of
" the guage at its original accuracy.

The rails are secured in the chairs by bolts and nuts.

[Printed, 6*d.* Drawing.]

A.D. 1860, June 8.—N° 1414.

MONKS, James. — (*Provisional protection only.*) — " Improve-
" ments in the rails and chairs of railways."

The patentee says, " I form the railway chairs "of two parts,
" one half being on each side of the rail, and draw and hold the
" parts together by a through bolt or bolts, and thus grip and
" hold the rail firmly in position. A tongue is formed on the
" one half of the chair which enters a recess in the other half
" and binds therein; the feet or soles of these half chairs are
" bolted down on the sleepers, the one part as a fixture and the
" other half having slot holes, through which its holding down
" bolts pass to prevent its sliding towards or from the rail. The

" rail consists of what I term a double bridge rail, being hollow, " and somewhat of a rectangular form in its cross section, having " midway of its depth flanges or ribs on which it rests and is " gripped by my improved chair; it may also rest on the lower " part. These rails " are made "with butt or lapped joints; the " lap may be midway of the depth or thickness of the flange, or " with the flange altogether on one part."

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 21.—N° 1513.

BUCKWELL, William.—(*Provisional protection only.*)—" Improvements in moulding blocks, slabs, pipes, and other articles, " and in the apparatus to be employed therein."

The invention partly consists in making blocks of cement hollow by the insertion of a core or cores in the mould box, and in adapting them for supporting the rails of railways. "To this " end a strong cast-iron mould" is formed "with two hexagonal " chambers, and in each is inserted a triangular metal case, which " is rounded at the angles, and has fitting against its sides three " radial plates which meet three angles of the chamber and thus " each chamber is divided into three compartments. The moulded " blocks or railway sleepers produced in this mould will have for " their base two sides of the hexagon, and for their upper part " inclined sides and a recess capable of receiving a rail and suitable wedges or elastic bearings or filling pieces for holding it in " suspension."

The cement is consolidated by blows of a hammer.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 23.—N° 1527.

RAMSBOTTOM, John. — " Improvements in supplying the " tenders or tanks of locomotive engines with water."

"This invention relates to a peculiar system or mode of supplying the tenders or tanks of railway locomotive engines with " water without requiring the stoppage of the train, and consists " in the employment of a trough or long tank laid longitudinally " between or alongside the rails of the permanent way, which " trough contains the water which is to supply the tender or " tank. The water is conveyed from this trough to the tender " or engine tank by means of a dip pipe connected with each " tender or tank and curved slightly forward at its lower end,

" so that, as the train is passing along it will cause the water " to be forced up the pipe into the tender or engine tank. For " low speeds the dip pipe may open into the bottom of the " tender or engine tank and should then be provided with an " ordinary clack valve open upwards to prevent the return of " the water, but in the case of high speeds the dip pipe may " open into the tender or engine tank above the top water level, " in which case the clack valve may be dispensed with."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1860, July 3.—N° 1609.

MORRIS, James. — "An improved key for securing railway " rails."

"According to this invention keys or wedges for securing rail- " way rails are constructed in the following manner :—They are " made principally of metal, and shaped so as to fit between the " cheek of the chair, of whatever description, and the webb of " the rail partly filling up the space between the flanges of the " rail. On the side which when the key or wedge is in use is " towards the rail a recess is made, and into this recess a small " piece of wood on the flat of the grain is fitted so as to project " slightly beyond the surface of the key or wedge; thus when " the key or wedge is driven into its place the surface of the " wooden filling piece will bear against the webb of the rail."

[Printed, 6*d*. Drawing.]

A.D. 1860, July 9.—N° 1652.

HEINDRYCKX, Floride. — (*Provisional protection only.*) — " Improvements in the construction of the permanent way of " railways."

One object "is to dispense with the use of separate chairs for " the support of the rails, and to secure the latter to convenient " lengths of angle iron, which when arranged and secured" "will " form longitudinal sleepers with a bearing surface of greater " extent than the sleepers usually employed."

In carrying this out, a T-shaped rail is employed, "the vertical " web of which is enclosed between the vertical flanges of two " bars of angle iron. The parts are secured together by means of " screw bolts and nuts, and the bearing plates of angle iron are " arranged in such a manner that the ends of the pairs of plates " are made to break joint, so that the extremities of no two plates

" on one side of the rail shall ever come opposite to a similar " joint on the opposite side of the rail."

[Printed, *4d.* No Drawings.]

A.D. 1860, July 14.—N° 1699.

PILE, JOHN, and SMYTH, JOHN ROBERT.—" Improvements " in the preservation of iron surfaces from corrosion or decay."

These improvements relate to "the application and use of a " peculiar composition and enamel for protecting iron and other " surfaces from corrosion and decay and specially applicable for " the preservation of the surface of iron ships, buoys, reservoirs, " gas, water, and other metal pipes. Also to the preservation of " wooden surfaces, railway sleepers, piles, wooden buoys, and the " wooden foundations of piers and other structures."

A coating of litharge, Venetian red, and varnish is first applied. " Over this coating, when dry," the patentees " next apply a " coating of composite enamel, consisting of the following ingredients in the following proportions, which proportions may, " however, be varied more or less, but a good effect will be " obtained from those given below :—Take of black pitch, resin, " asphalt, or any pitchy or bituminous substance equal parts by " weight, and add thereto, say, twenty pounds of coal tar or oil " to every one hundred and twelve pounds of enamel."

[Printed, *4d.* No Drawings.]

A.D. 1860, July 19.—N° 1754.

SAXBY, JOHN. — " Improvements in apparatus for, and the " mode or method of working and governing railway points and " signals."

This relates to further improvements on the Patents Nos. 1479 and 2258 of the years 1856 and 1858 respectively. The signals are combined with the points by a lever, " for operating which all " the signal levers which should be secured " are held fast, " and " those which should be free " are left open. Horizontally sliding locking bars are used.

Upon working a given hand lever, which is free to act upon its corresponding vibrating locking bar or bars, and so causing it or them to move in one direction or another, such locking bars or levers " simultaneously act upon such of the other vibrating " levers to which *those immediately* operated upon are connected

" and in such manner, that the recessed portions forming the
" shoulder pieces of these latter vibrating levers or 'locking
" 'plates' are opposed to or brought either in front or at back of
" their respective hand levers, and which, in this case, it is indis-
" pensable should not be free to be operated upon, and thus
" render it impossible to have the signals and points contradicting
" each other, which hand levers by this means become effectually
" 'locked' or kept in that position, in which it is indispensable
" they should remain."

A modification of the apparatus is also described.

[Printed, 1*s*. Drawing.]

A.D. 1860, July 24.—N° 1782.

JONES, Henry. — (*Provisional protection only.*) — " Improve-
" ments in rails for railways," which consist " in forming the
" rails in two parts, whereof the under part is fixed to the ordinary
" sleepers, and the upper part is inserted in the said lower part,
" and fixed therein by bolts or otherwise. For this purpose the
" upper part of the rail is formed with a tongue, which is capable
" of fitting into a deep groove in the lower part thereof, the bolts
" or other fastenings being passed through the two jaws or sides
" of the said groove, and through the tongue of the upper part
" of the rail. The two parts of the rail are arranged so as to
" break joint, thereby dispensing with the necessity of a fish
" joint. The lower part of the rail is intended to be permanently
" fixed to the ordinary sleepers or bearers for the rail, and the
" upper part is removeable by merely withdrawing the bolts or
" fastenings.

" By this arrangement the lower part of the rail is intended to
" remain as fixed, the upper part alone being changed as required
" in consequence of its wear."

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 25.—N° 1798.

KINGSLEY, Jeffries.—(*Provisional protection only.*)—" Im-
" provements in railways and in carriages to be used thereon."

The improvements refer to various details in the permanent way. Wires or rods are to be placed parallel to the rails to act as *guides to* pendant arms on the carriages; the rails may have grooves in their surfaces to hold steel rods to take the wear. The ends of rails and chairs at points are to be rounded off and nuts, bolts and fishes secured by melted lead.

[Printed, 4*d.* No Drawings.]

A.D. 1860, July 25.—N° 1803.

PILKINGTON, John.—" Improvements in means for protect-" ing and making water-tight exposed surfaces, such as railway " arches, bridges, roofs, and other structures."

The invention consists in protecting such surfaces by first applying a layer or coating of asphalt or bitumen, then a layer of "asphalted felt," and finally upon that another layer of asphalt or bitumen.

[Printed, 4*d.* No Drawings.]

A.D. 1860, August 2.—N° 1864.

RYDE, John.—(*A communication from Frédéric Paul.*)—(*Provisional protection only.*)—" An improvement in apparatus applicable " to turntable, swing bridges, cranes, and other machinery acting " on a pivot."

Replacing " by a pivot with ball and socket, the pivots and " rollers hitherto applied to turntables of railways, swing bridges, " cranes, and to every kind of apparatus moving on pivots by " a very extensive circular plate, and thereby to diminish the " resistance of all the above-named apparatus."

[Printed, 4*d.* No Drawings.]

A.D. 1860, August 3.—N° 1879.

HIGGIN, James.—" Improvements in railways, in railway " carriages, and in the mode of retarding and stopping railway " carriages."

The improvements in railways consist in making rails " of " strong angle iron, bolted or otherwise attached to longitudinal " sleepers." The inside angle of the longitudinal sleeper is, in fact, sheathed with angle iron.

[Printed, 10*d.* Drawings.]

A.D. 1860, August 10.—N° 1941.

PLUM, Thomas William.—(*Provisional protection only.*)—" Improvements in fixing tyres upon wheels and chairs, upon " sleepers, *part of which is applicable to rivetting generally.*"

"For the purpose of obtaining a more even and less detrimental "action of the wheels upon rails," the patentee proposes to cast "the ordinary chairs with the bolt holes at an angle instead "of being perfectly vertical, the bolts or spikes for fixing the "chairs are consequently driven into the sleepers skewwise, and "do not so easily draw by the action of the wheels upon them."

[Printed, 6*d*. Drawing.]

A.D. 1860, August 11.—N° 1944.

DE BERGUE, CHARLES. — (*Provisional protection only.*) — "Improvements in the permanent way of railways."

Constructing the permanent way by laying the rails directly upon the ballast, and "obtaining additional width of bearing by "longitudinal metal side supports or sleepers, one on each side "of the rail, which are not directly fastened or secured to the "rail, but are connected therewith by means of cross sleepers, "bearers, or bars . . . . fastened to the rails and the longitudinal "sleepers. And in constructing permanent ways . . . . with "the side sleepers so shaped and disposed as that the combinations of parts may present a trough-like section, so as to obtain "lateral steadiness by lying within the ballast."

"The cross sleepers are to, or may consist of chair-shaped "pieces or plates, and it is intended to dispose the several parts "so as to break joint, or bond with each other."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 14.—N° 1967.

FIELD, WILLIAM, and JEFFREYS, EDWARD.—"Improvements in the permanent way of railways."

Connecting the abutting ends of the rails together, so as to prevent their being moved vertically out of their places when the rails become loose in their seat. To this end corresponding notches are made in the butt ends of the rails, and in these notches a pin or tongue piece is inserted, which being secured in position, will prevent the ends of adjoining rails from rising up or moving vertically.

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 15.—N° 1982.

SAMUEL, JAMES, and TRAIN, GEORGE FRANCIS.—"Improvements in rails for streets and roads, and in wheels and "axles to be used thereon."

"The improvements in rails for streets and common roads con-
" sist in constructing them in such forms as will allow of their
" being reversed and used on the opposite side to that rendered
" unserviceable by wear."

Two forms are illustrated.

[Printed, 1*s*. Drawings.]

A.D. 1860, August 20.—N° 2008.

NEWTON, ALFRED VINCENT.—(*A communication from Joseph M. Heard.*)—(*Provisional protection only.*)—" An improved mode " of coupling the rails of railways."

Pieces are cut from one side of the head of each of the abutting ends. A horizontal slot is cut in the ends. A filling piece fits into the recess and projects through the slot to the other side of the web, where it is secured with a fish plate by bolts and nuts.

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 21.—N° 2010.

GREAVES, HUGH.—(*Provisional protection only.*)—" Improve-" ments in the construction of railways, tramways, or tracks for " carriages, and in the applicances for the conveyance of pas-" sengers, parcels, and letters thereby."

The invention consists "in employing surfaces or rails for the " wheels of vehicles to run upon, combined with hollow longi-" tudinal in the sleepers, interior of which " are placed " rails for " the guidance of suitable carriages, in which " are placed " parcels or letters, and which " are caused "to progress from " station to station by means of ropes of suitable material, guided " by rollers and sheaves, and actuated by steam engines or other " suitable power, at such distances apart as may be found most " convenient for the intended object. Apertures must be pro-" vided at each station for obtaining access to the carriages in the " interior of the hollow sleepers, and for the withdrawal of parcels " and letters conveyed therein. Where convenient and desirable " it is proposed "to lay down a tube of suitable material midway " between the rails or trams, for the purpose of receiving a haul-" age rope of suitable material for hauling the carriages along the " line of railway, suitable means being provided for attaching and " detaching them with facility at the stations." Where the *sleepers and rail are separate*, wood cushions are used. In carrying out the inventor's patent of 5 March 1857, the rails are to be made reversible by this patent.

[Printed, 4*d.* No Drawings.]

A.D. 1860, August 30.—N° 2096.

JOHNSON, John Henry. — (*A communication from James H. Swett.*)—" Improvements in the manufacture of railways chairs."

The invention consists " in first rolling a bar or slab of wrought " iron with two longitudinal ridges or ribs on one side thereof " near its edges, one of such ridges being larger than the other, " and containing sufficient metal to form the rail-holding jaw of " the chair. This bar or slab is then passed vertically or edge- " wise between a pair of rolls which form the larger rib or ridge, " into an overhanging lip extending from end to end of the bar " or slab. This bar or slab so rolled is now sawn transversely " into short lengths equal to the desired width of the chair, and " a mandrill of the size of the base of the rail to be fitted into " the chair is slipped under the lip of each chair, and by the aid " of a single blow from a fly press or steam hammer straightens " the chair and shapes the lip, so that it will exactly fit the rail. " The chairs may now have the spike holes formed in them, after " which they are ready for use. If desired, two lips or jaws may " be made by making both ridges or ribs of the same size, and " giving the bar a greater curve, which curve may be subse- " quently taken out by hammering or by passing through a pair " of vertical rolls, which receive it immediately on its leaving the " cutting rolls."

[Printed, 6*d.* Drawing.]

A.D. 1860, August 31.—N° 2101.

MARTIN, Charles.—(*Provisional protection only.*)—" Improve- " ments in the form and in the method of, and means for con- " structing beams, joists, girders, and rails, and in the permanent " way of railways generally."

"The rail is " so formed " that it shall have a triangular sec- " tional outline, that is to say, that it shall have three radiating " *axes* at angles of 120° to each other; symetrically round each " *of these* axes is the web which terminates either in a T or bulb " *form,* according to the particular application of the rail, or

" whether it is to be a joist, beam, girder, or rail; in like manner " there may be one, two, or three of these bulbs or terminations, " as wished." A set of three rolls is used to form the beam.

" Chairs " are formed " of a section similar in form to the lower " or double portion of " the " rail, but with an enlarged bearing; " a bolt and washer, or plate, or other suitable contrivance, covers " the outer lips of the lower bulbs of the rail, and holds it firm " in its seat. The chair may either be bolted on to a longitudinal " corrugated iron sleeper, in width about equal to that of its " bed, or the chair and its sleeper may be made all in one piece, " so as to form a continuous bearing to the rail, and similar in " section to the chair and sleeper before described."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 5.—N° 2141.

COOPER, JOHN.—(*Provisional protection only.*)—" Improve" ments in railways, railway carriages, and apparatus connected " therewith."

One part of the invention relates to " an improved railway " switch which moves down a smooth incline into its place when " the weight of a train comes upon it. When the weight of a " train is removed, a weight attached to the point returns it " back to the place whence it started, leaving the main track or " line of the railway open.

" Another improvement in switches consists in having the " points alternately to rise and to fall when moved by reverse " turning plates upon a shaft moved by a connecting rod and " balance weight. The rod is moved by a projection of an in" verted V-form, above the height of the rail. This projection " is arranged to move upon a double-inclined piston carrier slide, " and is acted on by an instrument passing down through the " floor of the locomotive, or tender, or other carriage; the " extreme point of the switch, when in place, will be exactly " flush with the rail."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 10.—N° 2185.

ROBSON, WILLIAM EVANS.—(*Provisional protection only.*)—" *The application of an improved elastic material for springs or* " *cushions on the chairs of railways and tramroads, or in any*

" other position to prevent the friction caused by the working of
" iron on iron or other metal substances."

The invention consists " in confining an elastic material (with-
" out the aid of metal plates) in the usual manner, with wedges
" to tighten the rails, but the improved elastic material will be so
" protected from the friction caused by the working of the rails,
" with the insertion of fine brass or other wire (or similar sub-
" stances) embedded, so as to cause the material to be firmly
" rivetted together through the meshes of wire or other material
" used, so that while it shall be free to yield in a vertical direc-
" tion, it will be prevented from pressing out laterally."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 25.—N° 2326.

HAWORTH, JOHN.—" Improvements in tramways for streets
" and ordinary roads, and in carriages for running thereon."

" The improvements in tramways consist in placing a grooved
" intermediate rail between the two rails on which the wheels of
" the carriage run. The rails for the carriage wheels are made
" of rolled T-shaped iron, and the three rails are attached to a
" groove longitudinal dovetailed wood sleepers."

" The improvements in carriages relate to those intended to
" run on tramways on rails similar to those above described, and
" consist in the application thereto of a pulley or wheel, or disc,
" the circumference of which runs in the groove in the inter-
" mediate rail, and is supported by a stud or axle connected by
" two diagonal stays or otherwise to the front axle, or other con-
" venient part of the carriage. When the carriage is running
" along a straight or nearly straight road, the circumference of
" the wheel or disc is in the groove in the intermediate rail, and
" keeps the wheels of the carriage on the outer rails, but in turn-
" ing a corner, or when it is otherwise necessary to deviate from
" the straight line, it is lifted out of the groove by a treadle or
" other apparatus, so as to set the carriage at liberty, and free to
" turn in any direction."

[Printed, 1*s*. Drawings.]

A.D. 1860, September 26.—N° 2336.

BURN, CHARLES.—" Improvements in the tramrails of street
" *railways* to prevent horses slipping thereon."

Longitudinal and transverse grooves are made in the surface of the tramrail, thus forming a number of projecting surfaces, which serve as a hold for the feet of the horses, and prevent them from slipping.

[Printed, 10*d*. Drawings.]

A.D. 1860, September 26.—N° 2337.

BURN, CHARLES.—"An improved tramrail for street railways."

The invention consists "in the construction of an iron rail " or tramway in such a manner that it may serve as a railway " for vehicles with flanged wheels, or as a tramway for vehicles " having ordinary wheels.

"The upper surface of the tramrail is cast or rolled with one " or more longitudinal grooves made in it in the direction parallel " with the line of tramrail, and other transverse grooves made in " it at right angles or with the longitudinal grooves, a portion " of the surface of the tramrail being for the purpose of forming " a railway for vehicles having flanged wheels, and the other " portion forming a tramway for vehicles having ordinary wheels.

"This iron tramrail is then laid upon a suitable foundation, the " upper surface being on a level with the surface of the street or " roadway in which it is laid."

[Printed, 1*s*. Drawings.]

A.D. 1860, October 8.—N° 2441.

JOHNSON, JOHN HENRY.—(*A communication from William Wharton, junior.*)—"Improvements in railways or tramways, and " in carriage wheels to be used thereon."

The said invention relates to a peculiar construction and arrangement of railways or tramways, and carriage wheels intended to run thereon, whereby the carriages are rendered self-transferring from the main line on to a siding or branch without the necessity of using turntables or moveable points. According to this invention it is proposed to make the points on those parts of the way where a siding or branch runs out of the main line, in such a manner as to remain always open, whether for the through traffic on the main line, or for the branch traffic, and in conjunction with these permanently open and fixed points is laid a guide rail, so disposed that by imparting a lateral thrust to the wheels *of the carriage* intended to be transferred to the siding or branch, those wheels will be caused to leave the main line and enter the branch line.

In carrying out this invention it is proposed to make those of the carriage to be transferred, and which are on the side of the line next to the guide rail, of a greater width than usual, so that as they pass the guide rail (which should stand higher up than the ordinary rail) they will be forced or pushed by it laterally into the branch, the flanges of the wheels passing through the open points. The guide rail may be placed either inside or outside of the line of rails, and the wheels to be acted upon by them may have annular projections or rims formed upon them, or special wheels for the guide rails to act upon may be employed. Those carriages which are not required to leave the main line are provided with ordinary railway wheels, and consequently they will not be acted upon by the guide rails, but will pass the points without leaving the main line.

[Printed, 8*d*. Drawing.]

A.D. 1860, October 9.—N° 2446.

WORTHINGTON, Edward, and MILLS, Robert.—" Im-
" provements in apparatus for preventing the retrogression of
" railway carriages on inclines."

For the purpose of scotching the wheels, the inventors propose " to place a lever on one or both the rails on the ascending
" side of any railway gradient, so weighted and arranged that on
" being traversed by the wheels," " however light, the pressure
" of such wheels will depress the upper arm of the lever to a
" level with the rail, but immediately that the wheel has passed
" over it that arm of the lever will rise and present an impedi-
" ment or ' scotch ' to any reverse motion of the wheel." " The
" other end of the lever will always be below the surface of the
" rail, and may be received in a chamber which may be easily
" constructed for that purpose beneath the rail." The force of
" impact may be lessened by buffers or springs."

[Printed, 10*d*. Drawing.]

A.D. 1860, October 9.—N° 2448.

STEVENS, Charles.—(*A communication from V. Clovis Simboiselle.*) — (*Provisional* protection only.) — " Improvements in
" atmospheric railways."

Part of the invention consists "in causing the operation of
" rarefaction to be accomplished by the conducting tube, which
" runs the whole length of the road instead of by the propelling
" tube.

"The conducting tube is sunk to a depth of about 3 feet, the
" whole length of the road; it is made of sheet iron, and com-
" municates with the propelling tube every 10,000 yds. This
" tube is covered with bituminous mastic, as is done with gas
" pipes, and is arranged in the same manner."

The rails are single T rails, fixed by cramps to wooden sleepers. Every 5 yards ties join them to preserve the gauge. The rest of the invention has relation to the valves, which are of leather and india-rubber, and the communication between the propelling and conducting tubes.

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 15.—N° 2512.

BURN, CHARLES.—"Improvements in tramrails for street
" railways."

"This invention consists of certain improvements in the form
" and mode of supporting iron rails, for street railways, so that
" they may be adapted for vehicles having flanged wheels, and
" may be laid in streets of cities and on common roads, without
" causing any appreciable obstruction or inconvenience to the
" traffic of vehicles with ordinary wheels on the same road or
" street."

Thirteen forms are shown, which are supported in various ways, on sleepers of wood or iron, or in some cases on the ballast itself.

[Printed, 10*d*. Drawings.]

A.D. 1860, October 15.—N° 2513.

BURN, CHARLES.—"Improvements in the permanent way of
" street railways."

"This invention consists in improvements in the form and
" mode of supporting iron rails, so that they may be laid along
" common roads and paved streets without impeding the ordi-
" nary traffic, and adapted for vehicles having flanged wheels."

Various patterns are shown arranged in different ways. The rails are protected by a row of paving stones on each side of the rail, which row also serves as a tramway for ordinary vehicles.

[Printed, 1s. Drawings.]

A.D. 1860, October 16.—N° 2519.

NEWTON, William Edward.—(*A communication from Alexander Hay.*)—" An improved mode of constructing rail" ways."

" The object of this invention is to construct the track of a " railway as to give it a firm support without the use of wooden " cross ties, and, if thought desirable, without the use of the " stringers also. This plan is particularly suited to the con" struction of city railroads, as the laying of it necessitates very " little displacement of earth or pavement, in which respect it has " advantages over the known modes of construction. The chief " feature of the invention consists in making the chairs which " are now used only for holding the rails in place, also perform " the office of sustaining the track. This is effected by so con" structing the chairs that a portion of it is imbedded in the " earth and forms a foundation for the track, while the part " which extends above the surface of the earth holds in place " the rails as usual. That portion of the chair which is to be " imbedded in the earth is made in the form of a screw, or of " a wedge-shaped pile. The upper part or head of the chair is " provided with jaws or a recess for holding the rail as in the " ordinary chair."

[Printed, 8*d*. Drawing.]

A.D. 1860, October 18.—N° 2549.

BRUCE, George Barclay, and STEIN, Andrew.—(*Provisional protection only.*)—" Improvements in rail and tramways."

" The form of the rail and tramways may be varied, but it is " preferred that the rails should be formed of such cross sections " that one part should form an edge rail suitable for flanched " wheels to run on, and another part should be flat or nearly so, " and suitable for wheels having plain tyres to run on. This " invention also relates to the form of switches used when con" structing rail and tramways, and consists in dispensing with " the moveable tongues usually employed when constructing rail " and tramway switches, and at the same time so forming a " switch that the flanches of the wheels will be caused to rise on " and pass over the edge rail at the switch when passing from " one line of rails on to another."

[*Printed*, 4*d*. No Drawings.]

A.D. 1860, October 27.—N° 2620.

HATHAWAY, CHARLES.—" Improvements in the construction " of street railways, and in the wheels to run thereon."

It is proposed " to construct the rails or tramways either of cast " or wrought iron, and the working surfaces of the rails are made " with double treads at different levels, one being intended for " the flanged wheels of the street railway cars, and the other " for the wheels of ordinary carriages. This compound rail when " made of cast iron is cast in one piece, and has sockets and pro- " jections cast in or on the ends for the purpose of fitting into " one another, and thereby preventing the rails from moving in " a vertical direction. Sockets to receive keys or cottars are also " cast on the sides of the rails to act as a further security. When " this rail is made of wrought iron it will be found convenient " to roll it in two parts, which are afterwards to be united laterally " by means of bolts, rivets, or otherwise, so as to form the com- " pound rail. . . . . These rails may be double headed, so that " when one surface has been worn out, the rails may be turned " over and present a fresh working surface. The working sur- " faces of the cast-iron rail may be chilled in order to harden " the same, and render them more durable. In joining the two " parts of the rail together they should be made to break joint, " and it is important also to notice that the flanges of the cars " are made less than half an inch in depth, and that the difference " in level of the two lines of tread in the compound rail is little " more than one quarter of an inch; consequently ordinary " carriages when obliged to cross the track will not be subjected " to a severe shock as at present."

The turn-outs or switches are provided with fixed points so arranged, by one being placed a little in advance of the other, that they will always turn the carriage into the right-hand track at these points when going forward, but when the carriage is coming in the opposite direction it will be allowed to pass from the left-hand turn-out into the main line by passing over the points. These fixed points are made to act in this manner by being laid a little back from the straight line, and in line with the turn-out-track, which at these points are formed of curves of any convenient radius.

[Printed, 10*d*. Drawing.]

A.D. 1860, October 31.—N° 2660.

BULL, William.—" Improvements in the permanent way of " railways, and in connection therewith."

The inventor proposes to use " in a double-headed rail, reversi- " ble in the chairs and fastened therein by a wood key. The heads of these rails are made in the form of the section of a horse's " hoof, and the connecting rib is formed nearly flush with the " side."

" The chairs are single for intermediate bearers, and double and " tongued, and for the joints, obliquely angled, and secured to the " sleepers on a new principle of fastening, which " is denominated " dovetail and wedge-spiking. This mode of fastening is also " applicable to right-angle chairs and flanged rails, for both " which " it is also intended. " The oblique angle principle " is adopted " in forming the chairs, in order to obtain a broader " bearing, and at the same time to cause both spikes to traverse " the centre of the sleeper."

The rails are insulated to serve as telegraphic conductors.

[Printed, 10*d.* Drawing.]

A.D. 1860, October 31.—N° 2666.

ANDERSON, James.—" Improvements in the manufacture of " felt, and in the mode of applying the same to railways and to " other uses."

The invention " has for its objects the production and appli- " cation of a fibrous waterproof material as a substitute for " asphalte and other materials in their application to railway " arches, platforms, floors, foundations, walks, and other pur- " poses to which asphalte and like materials are ordinarily " applied " various thicknesses of felt are combined in " layers " by means of tar or pitch, so as to form, when thus combined, a " felt of considerable increased thickness and strength. Asphalte " may be applied to the outside or other part of the consolidated " felt, if thought desirable."

[Printed, 4*d.* No Drawings.]

A.D. 1860, November 10.—N° 2766.

DAFT, Thomas Barnabas, and POLE, William.—" Im- " provements in the fish joints of railways."

"For these purposes between the screw nuts and the fish plates
" of fish joints of railways a metal washer is used suitable for embracing two or more screw bolts, and between such or single
" washers an elastic washer, by preference of vulcanised indiarubber is introduced. By these means the elastic washers will
" tend to prevent the jar or vibration passing to the screw nuts,
" and at the same time the elastic pressure between the metal
" washer and the side of the fish plate will tend to prevent the
" screw nuts turning round on their screw bolts. The long metal
" washer will also have a beneficial action in preventing, when
" screwing up of the nuts, any prejudicial drag or action on the
" elastic washers, and such long washers will themselves also be
" more effective than single washers in preventing the screw nuts
" becoming loose."

[Printed, 6*d*. Drawing.]

A.D. 1860, November 10.—N° 2768.

WILSON, Edward Brown.—"Improvements in the manufacture of railway wheels, tyres, axles, and points, and crossings,
" which improvements are also applicable to the manufacture of
" ordnance, tubes, and metal cylinders generally."

The invention consists "in shaping and compressing such articles after they have been cast or forged, by the aid of suitable
" dies acted upon by hydrostatic pressure."

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 20.—N° 2841.

MACNEILL, Thomas Telford.—"Improved means of obtaining adhesion on railways for ascending inclines and other
" purposes."

"The tyres of the driving wheels of the locomotive engine" are constructed "with the flange and the adjoining part or 'tread' of
" the ordinary form for running on the ordinary rails, the tyre"
is made "of an increased breadth, and a groove is formed" in this
" additional portion. At steep inclines, or wherever increased
" adhesion is required an additional rail" is fixed "of round
" or angular topped form on each side of the line. This rail
" slopes up a little at its commencement, so that as the grooved
" part of the tyre runs upon it the wheel is gradually raised until
" it runs clear of the ordinary rail, and the weight of the driving
" *wheels and the load* upon them is borne by the additional rails.

" A greatly increased amount of adhesion is thus obtained, owing " to the wedge-like action of the rails and grooves, and the " engine is thus enabled to draw greater loads up steeper inclines " than would otherwise be the case. The wheels of the carriage " continue to run on the ordinary rails."

One angular rail may be used on one side if preferred.

[Printed, 10*d*. Drawing.]

A.D. 1860, November 23.—N° 2867.

DERING, George Edward.—" Improvements in the per" manent way of railways."

In constructing the joints and various connections of parts of the permanent ways of railways, fastenings are used made of steel, which are tempered, or of wrought iron iron, which are case or surface hardened, and they are applied to make and keep tight, by virtue of their elasticity, the various connections of the permanent way of a railway in place of or in addition to other fastenings now employed.

One method of making a suitable fastening for the connecting and holding together of two consecutive rails, consists of a clip, which partly embraces the ends of the two rails, passing underneath them, and the upper parts of such clip press upon the sides of the two rails or upon their extended base in the case of bridge rails. These clips, if made of steel, are tempered, or if of wrought iron they are case or surface hardened, and by their elasticity the ends of the two rails are held forcibly and securely in juxtaposition, an interval being allowed for the expansion of the rails if desirable.

Spring keys, wedges, spikes, trenails, clips, &c. are also made on this principle.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1860, November 24.—N° 2890.

FOX, Samuel Mickle.—" Improvements in rails for railways, " and in the wheels of carriages to run thereon, especially adapted " to street railways."

A grooved rail is used as a " guide rail for the cars, and a flat " rail for the outer wheel, so that by placing the two grooved " guiding rails as near as convenient to each other in the centre " of the street, and the flat rails on the outer sides of the track " there is no obstruction to other vehicles, because the flat rails "can be travelled on as well as any blocks of paving stones, while "the grooved rails near the centre of the street are out of the "way of the respective lines of travel up one side and down the "other of the street, and occupy but about two feet instead of "about fourteen feet as now used for the tracks; and these "grooved rails are no inconvenience in crossing, because a vehicle "would at the centre part of the street pass over these rails nearly "at right angles, or at a sufficient angle to be uninjured, and the "groove is too narrow to admit the tires."

[Printed, 6d. Drawings.]

A.D. 1860, November 26.—N° 2894.

TRAIN, George Francis.—(*A communication from Ralph Nowell Musgrove.*)—"Improvements applicable to street railway carriages, "part of which are suitable for other purposes."

This invention consists in part of "an improved rail clearer, "one to be carried in front of each of the leading wheels of rail-"way cars, for removing stones or other obstructions. This rail "clearer consists of a piece of metal or other suitable substance, "having the under side thereof formed to coincide with the con-"tour of the section of the rails, and at the front pointed vertically, "so as to cause it to remove obstructions either to one side or the "other of the rails. These improved rail clearers are mounted on "suitable arms projecting from the carriage frame, and are carried "immediately above and in close proximity to the rails, a little in "advance of the leading wheels."

[Printed, 8d. Drawing.]

A.D. 1860, December 1.—N° 2946.

GREAVES, Hugh.—"Improvements in the construction of rail-"ways, tramways, and in vehicles to run thereon, portions of "which improvements are applicable to other useful purposes."

"In the combination of a flush rail of fixed guage with a "cellular or reticulated cast-iron tramplate, for the purpose of "accommodating the traffic of vehicles of varied guage of wheels, "and thus combining the advantage of the edge rail with those "of the tramplate."

When sleepers are employed, they are prepared in the form of pipes, through which fluids or gases may be conveyed. Sleepers constructed of wood and iron tubes in combination may also be employed.

Edge rails of ordinary form may also be used in combination with longitudinal sleepers of timber, secured thereto by clamps and bolts, the bolts passing beneath and not through to the rail.

Various modifications are shown.

[Printed, 8*d.* Drawing.]

A.D. 1860, December 1.—Nº 2950.

TIZARD, WILLIAM LITTELL.—" Improvements in fastening " threaded nuts and bolts."

The invention consists "in the employment of a washer, one " side of which is extended, and has the edges turned down over " the 'fish plate,' a slit" is made "in the washer parallel with " one of the sides of the nut, and another slit so as to form a " tongue. After the nut is screwed up the tongue" is turned up, "and thus the nut is prevented from turning."

[Printed, 6*d.* Drawing.]

A.D. 1860, December 11.—Nº 3043.

PYM, JOHN.—(*Provisional protection only.*)—" Improvements in " railway sleepers," by forming a "longitudinal groove in the " under side of a wooden sleeper, and placing under it a piece of " perforated metal, or " attaching "to the sleeper a pipe or piece " of curved metal, perforated at the sides to admit of the water " absorbed by the ballast passing into the cavity so formed, and " flowing out at the ends, thus forming a drain pipe under each " sleeper, which prevents the accumulation of water around the " sleeper, and 'the sopping' so prejudicial to the permanent way."

[Printed, 4*d* No Drawings.]

A.D. 1860, December 19.—Nº 3115.

McGANLEY, JAMES WILLIAM.—(*Provisional protection only.*) —" Improvements in means or apparatus for preventing collisions " on railways."

" By shutting off the steam while the locomotive engine is in " motion, ... by means of an inclined plane, inclined " planes, or other suitable contrivances placed between, on, or " near the rails of the railway, and acting upon other machinery " or apparatus attached to the locomotive engine."

[*Printed,* 6*d.* No Drawings.]

A.D. 1860, December 20.—N° 3125.

FOURNIER, Amédie Benoit. — (*Provisional protection not allowed.*)—" Preventing accidents on railways."

The invention " consists of a lever combined for preventing the " collison of locomotives coming or going to meet one another, in " a straight line, in a curved line, or when many lines traverse the " one and the other. This system consists in a little apparatus sup- " porting the levers," " placed on the way at a distance of 1,100 " yards one from the other, but communicating with each other " in every 2,200 yards, and by that means forewarning any loco- " motive which is within the distance of 2,200 yards, either " before or behind. Supposing some carriages become detached " on the line, and a train coming before or behind is obliged to " stop, the engine driver who is warned of the approach of a train " by the apparatus, which shuts off the steam and which gives an " alarm by whistling."

[Printed, 4*d.* No Drawings.]

A.D. 1860, December 27.—N° 3171.

GUERRÉE, Toussaint Victor.—(*Provisional protection only.*) —" An apparatus for moving waggons or carriages on railways."

" It consists of a frame placed on wheels running on the rails " provided with a platform for an attendant to stand upon, and " with a winch handle for giving motion to a worm or endless " screw, in gear with a worm wheel upon the axle of the railway " wheels. The top of the frame engages in a hook on the car- " riage to be moved. The wheels may be roughed or jagged to " give them a better hold on the rails, and the bite may be further " secured by means of a rod carried from the top of the frame " to an excentric on the axle of the wheels."

[Printed, 4*d.* No Drawings.]

1861.

A.D. 1861, January 3.—N° 14.

FULLER, William Coles, JAQUES, James Archibald, and FANSHAWE, John Americus.—" Improvements in the " *adaptation of india-rubber* and analogous gums and compounds

" thereof to valves, pump buckets, packing, and other parts of " steam, water, air, and gas engines and apparatus."

The invention consists in a joint combination of "hard" and "soft" india-rubber, for making valves and packing, &c.

"Valves for pneumatic railways . . . . . may be constructed " of junction rubber."

[Printed, 8*d*. Drawing.]

A.D. 1861, January 10.—N° 68.

LONGMAID, WILLIAM.—"Improvements in hardening the " surfaces of the rails of railways, and the surfaces of tyres of " railway wheels, and in charring the surfaces of timber to be " used for railway sleepers and other purposes."

For these purposes the rail and the tyres of wheels, "after they " have been formed in the usual manner, ... are packed in " a suitable chamber with peat, or wood sawdust, or other vege- " table matter, previously saturated with dilute sulphuric acid or " not, so that the peat or the wood sawdust is in contact with the " surfaces to be hardened; the chamber is then closed so as to " exclude the air, but at the same time to allow of the escape of " the gases evolved during the operation, and by heat applied " externally the chamber and its contents are heated to a red " heat, and retained at that temperature for a time. By this means " not only will the process of hardening be performed, but vege- " table charcoal will at the same time be produced. In charring " the surfaces of timber for railway sleepers and other purposes, " the pieces of timber" are immersed "in dilute sulphuric acid, " and" then packed as before. Heat is then applied externally to a temperature of about 250 to 300 degrees, and retained at that temperature for a time. "By this means the surfaces only " of the timber that has been saturated with dilute sulphuric acid " will be charred."

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 11.—N° 85.

WOODCOCK, WILLIAM GEORGE.—"Improvements in wrought-iron beams or girders and columns."

Bars of iron are rolled nearly of a trough shape, "two of them " *rivetted*, or bolted together back to back constitute a beam or " *girder*, having flanges both at top and bottom. At the outer

" angle of each bar is a depression of a wedge shape, and when " two of the bars are fixed together, two of the depressions being " opposed to each other at top and bottom of the beam, constitute " dovetails." "Joists of wood may be inserted in the said dovetails, to which joists, flooring, or other woodwork may be connected or joined."

"Beams or girders, having short flanges at their sides," made on this principle "may be used as railway beams."

Columns are formed on this principle.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1861, February 1.—N° 271.

DE ARRIETA, José Joaquin.—"Certain applications of chapapote and its products, and of the same combined with other " substances, and of materials treated therewith, to various purposes in manufactures and the useful arts."

The patentee claims, amongst other improvements, "the application to rails, railway chairs, and sleepers, of chapapote combined with other substances, especially with silicious or other " mineral matter, preferably by immersing or steeping the rails, " chairs, and sleepers in such chapapote mixture while hot."

[Printed, 6*d.* No Drawings.]

A.D. 1861, February 9.—N° 333.

WHILE, Charles.—"Improved rolling machinery for rolling " iron and other metals."

"Instead of rolls with grooves decreasing in size on the length " of the rolls, in using which rolls the bar or bloom must be " entirely free from one groove before it can be inserted in the " next, and much time is necessarily occupied by taking the bar " or bloom over the rolls with large levers and tongs and turning " it sideways for the purpose of edging (the object of" this "invention is to do away entirely with laborious work, and to work " the iron or other metals while in a welding state). For this " purpose rolls" are placed "in a vertical or approximatively " vertical position, or at an angle in the midst of, or conjoined " with a series of horizontal rolls with one or more grooves in " them, and at such a distance that the iron or metal may " be enabled to enter one pair of rolls before leaving the other " pair."

"This invention is more particularly applicable for blooming, " roughing, or slabbing rolls, yet in many instances it can be " applied to finishing rolls. The iron is brought from the furnace " on a carriage, and is thrown between the first pair of rolls, and " then passes through the whole series of them without any " stoppage, and without manual labour, consequently the iron " will be more properly welded, which is of the greatest importance in rail making."

[Printed, 6*d*. Drawing.]

A.D. 1861, February 19.—N° 410.

NEWTON, ALFRED VINCENT.—(*A communication from Joseph M. Heard.*)—" An improved mode of coupling the rails of railways."

"The object . . . . is to connect together the abutting ends of " rails in a manner that will allow of the expansion and contraction of the rails" "to provide against the springing of the " rails at the joints," " and to neutralize the effect of the lateral " thrust at the joints."

The invention consists in " cutting away a portion of the head " of the rail" at each end, " and in cutting a horizontal slot a " suitable distance into the neck of the abutting rails; and in " forming the joint or joints after the rails are laid down by the " introduction of an artificial head-bearing piece that breaks joints " with the rail, and serves to fill up the spaces cut out of the " rails, and to strengthen the rail at the joint against lateral and " downward strain; and in conjunction with this brace support " is used a fishing bar that is placed on the opposite side of the " rail, and serves to strengthen the rail. The whole are to be " secured together by bolts and nuts."

[Printed, 6*d*. Drawing.]

A.D. 1861, February 25.—N° 480.

BARNES, EDMUND FORMAN.—" An improvement in railway " chairs, and being a combined chair and splice."

The invention or improvement combines " a railway chair . . . . " and a splice which serves the purpose of a joint to hold the " ends of the rails in position and prevent them from moving " sideways or vertically, and is so arranged" " that there can be " no break or opening between the ends of the rails to affect the " motion of the carriage, or by which the rails can be injured by

" the percussion of the wheels, but a continuous unbroken bearing
" surface is secured."

The splice is a kind of dowel, let into the rails.

[Printed, 8*d*. Drawing.]

A.D. 1861, March 1.—N° 530.

BIRCH, Eugenius, and **MERTENS**, Herman Dirs.—(*Provisional protection only.*)—" Improvements in the permanent way " of railways."

" A peculiar form of combined sleeper, chair, and fishing plates, " made of wrought iron in one piece." The plate from which they are made, " is bent or drawn whilst hot, so as to bring its " opposite edges near to each other, and to turn them up for the " purpose of forming the fishing plates."

" The general section of the sleeper is that of a hollow arch, the " rail being gripped between the turned-up edge of the plate, and " remains suspended above the base of the plate and out of con- " tact therewith, so as to allow it to yield to a passing load, and " so form an elastic permanent way."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 4.—N° 547.

EMERY, Samuel Anderson.—(*Provisional protection only.*)— " Improvements in portable apparatus for transporting locomotive " engines and trains from one line of rails to another."

The invention consists " in arranging portable apparatus suit- " ably constructed for being readily put together and taken to " pieces, and easily carried in the guard's van or other suitable " portion of the train, so as to be available in case of any acci- " dent, slip, or other casualty blocking up one line of rails the " trains could be shifted on to the opposite line till the obstruc- " tion be removed, when the crossing could be taken up and " carried away, leaving the line of rails perfect and fit for imme- " diate traffic."

The apparatus consists of points and crossing so made that the point fits over the rail and is fixed to it by set screws. The outer rail, when it crosses the inner rail, is fitted " to slip over and lodge " on the rail, raising the same about one inch " to allow the flanges to pass. The rails are fitted in chairs and adjusted by set screws.

[Printed, 4d. No Drawings.]

A.D. 1861, March 5.—N° 555.

SCOTT, Thomas.—(*Provisional protection only.*)—" Improve-" ments in the construction of roadways and tramways."

Instead of paving or pitching the roadways, "trays or open " boxes, or frames of iron and wood" are employed, and they are packed full of flat pieces of stone or other material placed on edge. The stones " so packed in the trays may be set in sand, " gravel, or other substances, or grouted with cement or mortar, " so as to form one solid block, or they may be simply wedged " in tight." Such trays, so filled with stones, are placed on the prepared foundation of the roadway, with the stone surface uppermost, "so that when the whole is filled in with them it shall " present generally a level surface, the irregular interstices " between the stones affording a better hold for the horses' feet " than the present methods of forming the roadways do." It is also proposed to employ these trays either to form tramways of themselves, or the roadway for any form of tramway.

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 12.—N° 606.

STOCKER, Alexander Southwood.—(*Prvisional protection only.*)—" Improvements in the manufacture of rails for railways."

The invention consists "in the manufacture of metal bars upon " which the wheels of the rolling stock of railways are intended " to travel, and consists in the application for that purpose of a " metal commercially known in the market as steel iron in com-" bination with ordinary wrought iron," the piling and welding being effected as may be found most convenient, " or the steel iron " may be used in its entire state."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 14.—N° 632.

ROESSLER, Frederick.—(*Provisional protection only.*)—" Im-" provements in apparatus or means for preventing locomotive " engines and carriages leaving the rails."

"The application of an extra line or extra lines of rails placed " parallel with the ordinary rails of a suitable form, so that guard " clips secured to the carriages will pass along such rails without, " however, being in contact therewith." " The clipping or holding " parts of the rails are disposed in opposite directions to each other

" so as to embrace the clips on the carriages," or the carriage clips may be arranged to embrace the rails. " In either case the car-" riage clips consist of strong rigid iron supports depending from " the carriage or engine framework, the terminations of which are " furnished with parts to clip or pass underneath the flange or " rib of the safety rail; these supports are also furnished with " shoe pieces or surfaces which are adapted to slide on the rail " and support the carriage in the event of a wheel coming off or " breaking. Both this shoe and the clip embracing the safety " rail flange are so adjusted that they travel in close proximity to " the rail, but without touching."

A central **T** rail may be substituted for the two guide rails.

[Printed, 4*d.* No Drawings.]

A.D. 1861, March 14.—N° 639.

HUNTER, JAMES.—" Improvements in moulding and shaping " metals."

The invention relates to " an improved mode of casting wheels, " rails, pillow blocks, and other generally similar details, so as to " obtain hard and durable surfaces thereto, as well as economy of " time and expense in moulding. Under one modification the " mould " " is made entirely of iron," " in two parts, in manner " similar to the ordinary sand moulds; these parts are placed " one upon the other, and when so arranged a cavity is left " between the parts corresponding to the form of the wheel to be " cast. A metal core is arranged in the centre of the mould " which passes through the two parts, and this forms the aper-" ture in the centre of the wheel to receive the axle or spindle, " which may be either fast or loose. A vertical tubular aperture " is formed in the upper half of the mould which conveys the " molten metal down into the cavity formed in the body of the " mould."

In casting " angle iron rails," a similar procedure is adopted.

[Printed, 8*d.* Drawing.]

A.D. 1861, March 18.—N° 676.

ARROWSMITH, JOHN.—(*Provisional protection only.*)—" Im-" provements in street railways and railways on common roads, " and in locomotive engines and carriages for the said railways."

Part of the improvements consist " in attaching a rack to the " *side of one or both* rails or fixing a rack midway between the " *rails* " " *extending* either the whole length of the line of rail-

" way, or only along those parts where there are inclines. The " use of the said racks is to prevent the slipping of the wheels of " the locomotive engine."

[Printed 4*d*. No Drawings.]

A.D. 1861, March 22.—N° 721.

CLARK, WILLIAM.—(*A communication from Henry Lawrence, Charles Harcourt White, and Thomas Washington White.*)—" An " improved method of locking the nuts on railroad rail bolts," by " interposing washers between the nuts and fishing bars, and " securing the nuts to said washers by spring pawls on the nuts " engaging with ratchet teeth on the washers," " so that the nuts " may be set up when desired, but will be effectually prevented " from turning loose."

[Printed, 8*d*. Drawing.]

A.D. 1861, March 25.—N° 746.

BEERS, SYDNEY ALEXANDER.—" Improvements in rails for " tram roads, and in laying down the same in streets and high- " ways."

In laying down the tramroad " a narrow longitudinal trench " is opened in the pavement for each line of rails, and at dis- " tances " equal to the usual length of the rail; a thin iron plate, " some eight by sixteen inches, is firmly bedded " on the earth " forming the bed of the pavement. Upon these plates the rails " are placed, the successive joints resting upon the aforesaid " plates, the rails placed in proper line and gauge, the wedges " driven into place, and the earth firmly tamped under the base " of the rail so as to furnish a uniform and continuous bearing."

The rails are concave to receive the wheels without flanges. Tie rods, passing through holes in the rails, may be used, or wooden sleepers, to preserve the gauge.

[Printed, 8*d*. Drawing.]

A.D. 1861, April 3.—N° 823.

SEVILLE, JOHN, and LAWTON, WALTER.—(*Provisional protection only.*)—" Certain improvements in starting and retarding " or stopping railway trains."

" In the employment, in connection with the buffer or framing " of the same, of a chamber conveniently situated for discharging " sand, steel filings, or other suitable minerals, earths, mixtures, " or compositions upon the rails, with the view of obtaining a

" firmer hold of the wheels, or preventing them slipping, and " thereby facilitating the starting and retarding or stopping of " the train, the said materials being discharged from the receptacle " when required by the opening of the valve in the lower part of " the same, and a flexible pipe or tube employed in connection " with the outlet passage in the lower part of the receptacle for " conducting the sand to the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 4.—Nº 830.

SHEPARD, William Albert.—(*Provisional protection only.*)

" Improvements in street railways, and wheels, and apparatus " to be used therewith."

"One form of rail (which may be called a guide rail) has two " flat surfaces or wheel tracks, one on each side of a raised centre " rail which runs continuously with the flat surfaces. This raised " portion of the rail may be made of a rounded or angular form, " or in place of a raised rib or rail a groove may be formed between " the two plain surfaces suitable for receiving a flanch on a wheel. " The other rail which is to be laid parallel to the one above " described to complete a line of way is (wherever the track is " straight or the curves are not too abrupt) a simple flat rail of " the same width as the other. Both these rails are to be " laid flush with the street. The wheels have each two flanges " which project one on each side of the treads or peripheries of " the wheel sufficiently to run smoothly upon the flat surfaces at " the sides of the raised centre of the rail, the raised part of the " rail thus becomes a guide to keep the wheels, and the carriage " upon the line of rails. These wheels are each in two parts, the " plane of division being perpendicular to the axle of the wheel, " and being a continuation of the plane of the inner surface of " the inner or outer flange of the wheel according as the cases " may require. When a wheel is thus divided, one part is fixed " to the axle and revolves with it, while the other revolves on the " axle, thus preventing the two flanges from binding on a curved " way and from running of the guide rail. When a groove, in " place of raised rib or rail is used the wheels are made with a " rib or projecting band or ring to run therein and be guided " thereby."

A wire brush is used to clean the rails.

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 5.—N° 839.

BROWN, David, FELLOWS, Noah, JONES, Edward, and BROWN, William.—"Improvements in the manufacture of nails, railway spikes or pins, and gas-tube fastenings, and in machinery employed in the said manufacture."

"In rolling iron for making nails," it is preferred "to roll the bars of such a figure that when cut transversely two nails are produced, joined together at the summits of their heads, the junction being so slight that the two nails form by each cutting generally separate in the act of cutting, or if they do not, they may be readily separated afterwards."

"Before cutting the iron so formed into nails," it is so far flattened "as to bring the two halves into the same plane."

Railway spikes and pins are similarly made.

[Printed, 10*d*. Drawing.]

A.D. 1861, April 13.—N° 915.

ABEL, Charles Denton.—(*A communication from Jean Joseph Adolphe Poulet.*)—(*Provisional protection only.*)—"Improvements in the construction of turntables."

"These improved turntables consist of two pair of parallel bearers of suitable sectional form, one pair being at right angles to the other pair, so as to intersect each other, and the distances between the respective bearers of each pair corresponding with the guage of the railway, which four bearers are all cast in one piece of cast steel, together with a portion of a ring corresponding with the diameter of the turntable, and connecting the ends of the two bearers of each respective pair.

"The turntable has also a further portion cast in one with it situated in the central square space formed by the crossing of the four bearers, and containing the socket by which the turntable is made to rest upon the fixed upright central bearing fixed to the foundation plate."

Inclined planes are placed at the crossings of the rails upon which the flanges rest while passing the gaps. The rollers of the turntable only take a perfect bearing when at rest, the centre support carrying the turntable when in motion.

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 17.—N° 945.

***CLARK*, William.**—(*A communication from François Antoine Kieffer.*)—"An improved arrangement of atmospheric post for the

" transmission of letters, papers, and other despatches and articles " in tubes."

"The system of postal delivery called atmospheric post, de- " scribed, has for its object the transmission of despatches, " papers, parcels, and other matters, by means of a vacuum " obtained in a tube in which is a box furnished with a piston, " containing the objects to be transported. . . . . At each " station are disposed stops, so as to be able to remove the " despatches intended for a certain station and to insert those " for transmission thence;" apparatus is used and "disposed at " intervals to register the passage of the boxes; the whole are " also in electrical communication with each other and with the " central station."

[Printed, 10*d*. Drawings.]

A.D. 1861, May 1.—N° 1085.

BRAMWELL, Frederick Joseph, and OWEN, William.— " Improvements in the manufacture of rails, bars, plates, cylin- " ders, vessels, axletrees, cranks, wheel tyres, and other articles of " wrought iron or steel, and also in the machinery used in such " manufactures."

The invention partly relates to a mode of manufacturing rails, bars, and plates, so as to avoid the loss arising from the cutting off the ends, and the loss of time and labour in bringing the rails over the top of the roll. "An annular pile" is made "by coil- " ing iron spirally around a mandrill," or by other means, "and " then after having heated this pile to a welding heat" it is hammered "into an annular bloom." This bloom, or this annular pile if not hammered into a bloom, is placed between a pair of rollers so that the rollers "nip a portion of the circumference of " the annular pile or bloom, and thus continuously roll it out, " diminishing the section of the ring and increasing its diameter " until the section is that which is required for the finished rail, " or the thickness required for the plate. The complete ring" is then removed from the rolls, cut through and" opened out " into a bar, rail, or plate, and" straightened "by hammers or " by passing through rolls. In the case of rolling thin plates, " which would not retain sufficient heat to admit of their being " cut and flattened after they were removed from the rolls, cutters " are provided by which the cylinder is cut while in the rolls, and " *delivered from* them as a sheet."

The patentees propose to renew worn rails by heating and then increasing the section by upsetting. Another mode of doing this is to bend the worn rail into a hoop, and to re-roll it after the hoop has been completed by welding the joint. It is then cut and straightened. Blooms are also to be hammered in moulds.

The improvements also relate to the arrangement of the rolls.

[Printed, 6s. 4d. Drawings.]

A.D. 1861, May 4.—N° 1128.

SMITH, Edward Pease.—" Improvements in the construction " of radial traversing carriages."

" This invention relates to certain means for traversing loaded " carriages or trucks over a segmental or circular railway, for the " purpose of enabling such trucks to deposit their loads in arcs or " circles, by which means the construction of segmental or circular erections (such, for example, as forts for protecting the " sea coast, and which require their foundations to be laid under " water), will be greatly facilitated.

" This invention also applies to the transference of railway " carriages and engines to lines of railway radiating from the " centre of segmental or circular railways.

" In carrying out the invention," the inventor lays down " a " segmental or circular railway of any required radius and guage " and" mounts thereon a traversing truck carriage, which con" sists of a strong framing or platform mounted on flanged " wheels, and provided with a pair of rails of suitable gauge for " receiving the railway trucks, carriages, or engines to which it is " intended to impart a radial traverse motion. The wheels of the " truck carriage or radial railway, as it may be termed, are driven " through the intervention of suitable gearing, the motion being " transmitted from the outer to the inner wheels, and in such " manner as to give less surface speed to the inner than to the " outer wheels, to suit the smaller diameter of circle over which " they have to travel."

The inventor describes a modification of his invention for use " on a small scale," in which hand power is used through a crab, instead of steam. This part of the invention, however, he disclaims by a Disclaimer filed 28th July 1864, No. 1128*.

[*Printed, 1s. 4d.* Drawings. Disclaimer, printed, 4d. No Drawings.]

A.D. 1861, May 7.—N° 1148.

BEERS, SIDNEY ALEXANDER.—"Improvements in rails for "street railroads."

Four patterns of rails are shewn, which are designed to accomodate tramway and ordinary wheels. One form is supported in an iron chair; another is a box or hollow rail.

"In laying the rails no longitudinal string piece is used, but "the rail is spiked to cross ties placed at distances of about six "feet apart, or, when preferred, the rails" are placed "upon "thin plates of iron or tile at the joints, and the earth" is tamped "up firmly under the base the whole length of the rail," and the rails are held in guage by iron rods at suitable distances.

[Printed, 8*d*. Drawings.]

A.D. 1861, May 11.—N° 1197.

WILSON, WILLIAM.—"Improvements in the manufacture of "wooden keys and treenails for railways and shipping, and in "machinery employed therein."

"The improvements in keys consist in sawing and planing them "taper by improved machinery, which ensures uniformity in size "and shape, and an easy entrance into the chair."

"The improvements in treenails consist in making them "parallel three-fourths of their length, and then taper or conical "to fit the chair, the head of the treenail to be convex."

The wood is subjected to a chemical process by boiling in oil until thoroughly saturated, and then dried.

"The improved machinery for manufacturing the keys consists "of a frame carrying a cutting tool, which frame is made to move "up and down on standards to bring the cutting tool to act upon "the wood; the wood itself is supported against a guide or guage "upon a table hinged in such manner that the position of the "wood may be altered to obtain the cut required by inclining the "table."

The treenails are cut in the lathe.

[Printed, 10*d*. Drawing.]

A.D. 1861, May 17.—N° 1258.

DUNN, THOMAS.—"Improvements in machinery and apparatus "for altering the position of locomotive engines, carriages, and "*goods, and preventing* injury and accidents on railways."

The invention relates—

Firstly, to "constructing railway traversers in such manner "that those wheels working under the traverser and carrying the "weight thereof may be enlarged, and work with less jerks than "usual; also, that a less number of wheels than heretofore are "required. "A narrow gap" is cut "through the rail of the "permanent way," and the rail is supported by fish-plates or other suitable means, so forming a through cross tram plate, or a relieving piece to answer nearly the same purpose may be used. "By this means the engine and carriage wheels pass over "a narrow gap without touching the cross tram rails, in place of "the traverser wheels as formerly."

Secondly, to a kind of overhead crane for traversing carriages and to "altering the position of railway engines, carriages, and goods by "applying a traversing frame, having a centre pin fixed at each "end, which pin when depressed into a footstep raises the wheels "off their bed, thereby converting the said traverser into a semi-"turntable, capable of being used to turn an engine, carriage, or "goods, end for end, or entirely round, or to any required "angle."

Thirdly, to "making turntables steady, secure, and safe during "the quick transit of engines, carriages, or goods. To effect this "the table bottom is composed of a series of strong rings of cast "or wrought iron, so that the bearings are very short from one "ring to the other; all the rings are turned or made true to "receive a top of similar construction, which beds firmly upon "the bottom, and when together they are very firm and rigid. "The top is raised for the purpose of turning an engine, carriage, "or goods by means of a long lever or cams, or by hydraulic or "other power, which will overcome the weight of the table top "and its load, and so lift it off its bed; the top turns on a centre "piece and pin or ball."

Fourthly, to preventing injury and accidents on railways. To effect this the engines or carriages are made with double axles, one part working within the other, so that in case one should break or be disabled the other may carry its load into a station without injury or accident.

Lastly, the invention relates to moving engines, carriages, and goods safely at high velocities, which high velocities or speeds *endanger the* wheels, axles, journals, guards and under structure *generally.*

"This part of the invention consists in constructing the side
" frames of carriages so as to work into grooves made in side frames
" applied to railways, and also to form the said side frames of
" railways of sufficient strength to support the bodies of the said
" carriages, so that in case of any breakage of the wheels, axles,
" or underwork of the carriage, the body part would be supported
" and slide along like a sledge, instead of coming to the ground
" or being overthrown. The framing forming the road and guides
" may be made of timber, stone, iron, or other materials, or the
" fixed rail or road may fit into a double guide on the carriage to
" suit convenience, the object being to make the carriage body or
" top of goods' waggons, engines, or other carriages, to rest on
" the slides when the underwork gives way."

[Printed, 5*s.* 8*d.* Drawings.]

A.D. 1861, May 17.—Nº 1267.

ASHCROFT, PETER.—" Improvements in railway chairs and
" fastenings."

"For these purposes one of the jaws of a railway chair is
" formed with an inclined inner face in the direction from the
" top to the bottom, in order to receive a wedge vertically between
" the inclined inner face of the chair and a fillling piece interposed
" between the jaw of the chair and the web of the rail, and such
" wedge is prevented moving sideways by means of ledges or
" projections formed on the inner face of the jaw, between which
" the wedge is driven. The filling piece is made of cast or
" wrought iron, and is formed on one side to fit the hollow of
" the rail (or rails, if it be in a joint chair), and on the other
" side it is formed with angular grooves and ridges, so that when
" a wood or other soft wedge is driven in between the jaw of
" the chair and the filling piece the wedge will become grooved
" on that face which is in contact with the filling piece, and the
" other side of the wedge will become similarly grooved where
" it comes against the jaw of the chair, by reason of the inner
" inclined face of the jaw of the chair being also formed with
" angular ridges and grooves; by this means the wedge and the
" filling piece will be prevented moving sideways, whilst the
" wedge being driven vertically, will at all times have a tendency
" to descend in the space between the jaw of the chair and the
" filling piece."

[Printed, 6d. Drawing.]

A.D. 1861, May 21.—N° 1292.

GRIFFIN, George Featherstone.—(*Provisional protection only.*)—" Improvements in the manufacture or construction of " railway chairs and their fastenings, the latter being applicable " to other purposes."

The object of the invention is " to facilitate the taking up rails " for turning, and to dispense with the use of loose keys or " wedges in fixing the rails in the chairs," by constructing the " chairs in two parts, one part in the form usually adopted, the " other of a separate jaw or piece of metal partially curved, which " is made to press a piece of recessed wood, leather, or other " suitable material against the rail, as in a vice, by means of " a screw bolt, with a wedge-shaped head, placed" " under and " through a corresponding wedge-shaped or tapered hole, cast in " both parts of the chair, and so adjusted that by tightening the " nut which secures the wedge bolt," " the upper part or separate " jaw slides over the under part, and presses the wood against " the rail."

Or the chair may be constructed to take a key which is forced up against the rail by a wedge and screws. Elastic packing is placed under the rails and the nuts are secured by a pin fitting in a slot in the bolt.

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 6.—N° 1438.

NEWTON, William Edward. — (*A communication from Mallat de Bassilan.*)—" Improvements applicable to railways for " the purpose of facilitating the transport of carriages containing " goods and passengers across arms of the sea, rivers, lakes, or " inland waters."

The invention consists " in constructing a vessel into which the " laden railway carriages may be run from the end of the land " railway, and may be conveyed by such vessel to the outer side " of the water, and may be run out of the opposite end of the " ship on the other line of railway. To effect this, openings, which " may be closed with doors, are made at each end of the vessel, " and decks are constructed at proper levels, and provided with " rails."

" The doors at one end of the vessel are opened, and the carriages " are run from the land railway on to the rails in the vessel, " which is then propelled across the intervening water space, and " when it arrives at the opposite side, the doors at the other end

" of the vessel are opened, and the carriages run out on to the " rails of the railway on that side. The bodies of the carriages " are provided with small grooved truck rollers, and they are run " on to trucks, on which are fixed rails for the purpose."

"The carriage bodies are secured on these trucks by chains, " pins, or in any other convenient way, so that they can be easily " detached."

[Printed, 8*d*. Drawing.]

A.D. 1861, June 7.—N° 1441.

VAUGHAN, JOHN.—" Improvements in the manufacture of " railway sleepers."

These improvements consist in moulding surface, packed, or bowl sleepers for tram and railroads, by having the pattern of the usual shape, or any other form suitable, with two loose ends, one at the gib end and the other at the key or cotter end; these ends being kept in a firm and correct position during the operation of moulding. The pattern is then drawn from the sand mould in the usual way, leaving the two loose ends. After adjusting and finishing the mould the loose ends are drawn out. By this method the greatest accuracy is obtained in the length between the gib and key ends of the sleepers giving a very correct gauge between the rails.

[Printed, 10*d*. Drawing.]

A.D. 1861, June 8.—N° 1465.

RYMER, JAMES.—" Improvements in the permanent way of " railways."

The patentee proposes "to form the rails in the form of a " cross, but having the corners at the points of intersection " rounded or eased off, so as to fill in the acute angle, and thus " allowing the rails to be made tubular, if desired for the purpose " of drainage. The chairs to be used for these rails " would be better of " wood, the centre thereof being grooved or channelled " out with a V-groove, to allow of one of the projections on the " rail to drop into the two side peices resting on the top of the " wooden chair. The rails are to be secured to the chairs by " bolts or screws passed through their centres at about the angle " of 45°, corresponding holes being formed in the rails to allow " of their being taken up and turned round when worn. Thus it

" it will appear that eight running surfaces can be presented in " succession without the necessity of metal chairs or new rails."

[Printed, 6*d.* Drawing.]

A.D. 1861, June 28.—N° 1657.

LANE, MICHAEL.—" Improvements in the permanent way of " railways."

" For these purposes longitudinal bearers of wrought iron are " used, and they may be of any desired length, and they may be " employed at intervals along the rails of a railway, but it is " preferred that they should be continuous." " The bearers are " each composed of two separate parts, one outside and one " inside of the rail, and the two parts are both rolled or formed " to a similar section. Each of the two parts of a bearer consists of a plate by preference of about six inches in width, " but this may be varied, and the plates may be of any desired " length. The plates rest on the ground at a slight inclination from the side of the rail which they support. The edge of " each plate which comes next the rail is turned downwards " to the extent, of about three or four inches. At the sides of " the turned down parts of the two plates, and near the upper " surface where the rail is received between them, grooves are " formed, one in each plate, and by preference angular grooves, " so that when the two grooves of the two parts of a bearer come " opposite each other they will form a dove-tailed space between " the two turned-down parts of the plates of which a bearer is " composed. These plates are connected together at intervals by screw bolts and nuts, the bolts passing through the " turned-down parts of the plates. These rails used with these " bearers are rolled with an under web or projecting rib which is " of a dovetailed section, or of such other section as will correspond with the space produced by the grooves, in the two parts " of which a bearer is composed."

The rail will be held between the two plates of a bearer which press the rail on each side, and at the same time prevent it rising by the dovetailed or undercut form of the plates."

[Printed, 6*d.* Drawing.]

A.D. 1861, July 3.—N° 1685.

RICHARDSON, ROBERT.—(*Provisional protection only.*)—" An " improved railway chair for railways," " by which the upper lips " of iron half chairs are by elongation made to wedge through or

" into each other on opposite sides of the rails and in opposite " directions, so as to firmly secure the rails in the chairs without " the aid of wooden keys."

"The invention applies equally to single and double-headed " rails, and also to the construction and application of half-chairs " in such a mode as to retain the wooden or iron wedges or keys " in their places on each side of the rail and thus obviate the " necessity of the half-chairs wedging, as before mentioned, and " by simply placing them in contact with the ends of the wooden " or iron wedges or key before referred to, prevent the keys or " wedges from becoming loose and falling out."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 3.—N° 1688.

SIMONTON, John.—(*Provisional protection only.*)—" An im" proved traction engine, and apparatus applicable for the culti" vation of land."

" First, an endless railway or platform placed below the frame " of the engine, which will support the weight of the engine, and " at the same time in a peculiar way take hold of or grasp the " surface of the soil firmly and tenaciously, so that the power " of the engine may be applied to the traction of cultivating " implements."

"The endless railway or platform consists of rails, wheels, and " sleepers, arranged in an inverted order from that of an ordinary " railway, the rails being fixed to the frame of the engine, run " over and upon the wheels while the wheels are connected to and " supported by the cross bars or sleepers," which are jointed together "in the form of an endless band or chain, and which " constitutes the moving platform. These cross sleepers are of an " angular form in cross section, and have their apices downwards " when on the ground."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 23.—N° 1843.

GRIFFIN, George Featherstone.—" Improvements in the " permanent way of railways."

The rails rest on hollow sleepers of cast iron corrugated, in order to give a great amount of bearing surface and strength, and such sleepers may be oblong and placed at certain distances apart. Chairs are dispensed with, and the rails secured in position by means of jaws, which may be cast on each end of the sleeper, and made partially to suspend or support the rail, and those on one side are fitted with a spring catch firmly set in the sleeper, which catch is intended to fall into a ratchet cast on the rail key."

Instead of the spring catch, vulcanised india-rubber, or other elastic material enclosed in metal is used, and shooting a metal " bolt or other spring apparatus which will effect the same object as the spring.

Flanges are cast round the base of the sleepers or partially round them, and the tie bars are recessed in the sleepers and retained in position by the rail.

[Printed, 10*d*. Drawing.]

A.D. 1861, July 26.—Nº 1874.

JOHNSON, FREDERICK, and HOCKIN, BARTHOLOMEW.—" Improvement in securing or fastening nuts for railway fish " plates, and for other purposes."

" The invention consists " in dividing the point of a screw bolt " or pin logitudinally to an extent sufficient to enable a thin " metal wedge to be inserted therein, for the purpose of expanding the point of the bolt after it is in position and the nut has " been screwed on. The wedge piece should be of a width not " exceeding the diameter of the bolt at the bottom of the threads " at the part where the slot is formed, and " it is preferred " to " form a slot or long hole in the upper part or portion of it to " admit of a split pin being passed through it."

[Printed, 8*d*. Drawing.]

A.D. 1861, July 29.—Nº 1889.

BUSBY, WILLIAM, and BUSBY, DANIEL.—(*Provisional protection only.*)—" Improvements in street or road rails for omni- " buses and other vehicles."

The invention relates to the shape and mode of fixing rails for tramways on streets or roads, so that vehicles " having wheels " constructed with the ordinary or any plain tyre can run on the " same." The tops of the rails are formed " with slightly raised " guiding feathers on either side of the bearing surfaces; the said " *bearing surfaces* " are shaped to " the form and breadth of tyre " *best* adapted for the streets or roads where the rails are laid " *down*, and which may be concave, convex, angular or other " *form*," but by preference a perfect plane.

"The bottom or under side when resting on transverse sleepers " is perfectly smooth, but when longitudinal sleepers are used " have tapering flanges on either side to fit over the same. " Running angularly from the vertical sides between the guiding " feathers and flanges, or feathers, and under side, are small " countersunk holes or apertures, through which, and into the " sleepers, are passed the fastening bolts or spikes."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 7.—N° 1963.

HUGHES, Edward Thomas.—(*A communication from Jean Mathieu Rey, junior.*)—" An improved wheelbarrow wagon."

"This invention consists of making the shell or mouth part of " the barrow to move on a centre or eccentric attached to the " framework so that when it is to be emptied it can be upset in " the same manner as the ordinary shoot waggons used by excavators. Two wheels may be used for ordinary roads and four " for railways. This swing or shooting wheelbarrow is applicable " to all ordinary purposes, or may be used very advantageously " for the excavations for railways."

[Printed, 6*d*. Drawings.]

A.D. 1861, August 10.—N° 1993.

STOCKER, Alexander Southwood, and **STOCKER**, Alexander Richmond.— "Improvements in the manufacture of " horse-shoes, boot-heels, wheel tyres, rails, and safes."

"In preparing bars and plates for the purposes above men- " mentioned according to" the "invention, puddled bars or " plates of wrought iron" are placed "in an ordinary converting " furnace, and" operated upon "in the same manner as is gene- " rally practised when converting iron into steel. These bars or " plates are intended only to be partially converted, so as to leave " the inner part of the metal in its fibrous condition, whilst the " outer surface or surfaces are hardened to a greater or less depth, " and on one or more of its surfaces, as circumstances may " require." They are then formed into a pile of any "desired " number also of suitable length, breadth, and thickness; then " *the pile*" *is heated* "to a fusing or welding temperature, " *and passed through* an ordinary rolling mill, whereby the

" whole becomes thoroughly incorporated and welded together in " one solid mass, and rolled out to dimensions requisite for the " purpose intended."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 15.—N° 2034.

KAIN, Francis Allen.—(*Provisional protection only.*)—" An " improved manufacture of artificial stone or earthenware ap- " plicable for bricks, tiles, retorts, railway sleepers, and other " articles."

The invention consists " in crushing to powder and sifting " small and refuse or other slate in combination with other mate- " rials, and also " in vitrifying " the same in kilns at a high " temperature."

The form of the composition is as under:—Take of

Fine powdered slate - - - -	24 pounds
Carbonate of magnesia - - -	3 ounces
Fine sand powdered - - - -	3½ pounds
Fine ground silica - - - -	5½ ounces

" The whole of these to be thoroughly mixed together, and " then add nine pounds of wet clay of any description, and suffi- " cient water to form the plastic mass of a consistence suitable " for moulding the articles required."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 22.—N° 2102.

BAINES, William.—" Improvements in the construction of " girders, frames, or other apparatus, fixed or moveable, and for " certain peculiar forms or sections of iron used therein."

" In the forms or sections of plates used in the construction of " these frames or compound girders, one part of each is male and " the other female; by bringing these parts together they become " inserted, and being secured by bolts or rivets, effect a vertical " union and continuous bearing, branching or extending where " required; and in constructing the moveable parts of railway " turntables, the plates " are bent and formed " into suitable " parts or segments, and " secured " in their respective places " by bolts or rivets, thus constituting one entire frame, forming " its necessary cross girders, which may be produced to suit any " angle for any number of roads upon the table."

[Printed, 10*d*. Drawing.]

A.D. 1861, September 4.—N° 2199.

SCOTT, THOMAS.—(*Provisional protection only.*) — " Improvements in the construction of roadways."

Instead of paving or pitching the roadways, "trays or open " boxes, or frames of iron and wood" are employed, and they are packed full of flat pieces of stone or other material placed on edge. The stones " so packed in the trays may be set in sand " gravel, or other substances, or grouted with cement or mortar, " so as to form one solid block, or they may be simply wedged " in tight." Such trays, so filled with stones, are placed on the prepared foundation of the roadway, with the stone surface uppermost, " so that when the whole is filled in with them it shall " present generally a level surface, the irregular interstices " between the stones affording a better hold for the horses' feet " than the present methods of forming the roadways do." It is also proposed to employ these trays either to form tramways of themselves, or the roadway for any form of tramway.

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 5.—N° 2218.

NAPIER, JOHN.—(*Provisional protection only.*)—" Improvements " in machinery for rolling iron or other metals."

For rolling "railway bars," &c., two or more pairs of rolls are arranged at suitable distances apart from one another, in such manner that the metal to be operated upon shall pass straight onward through any requisite number of pairs of rolls placed in succession, and all in or about the same line or direction, the first pair being like the ordinary roughing rolls, and the last pair suitable for bringing the plate, bar, or other form of metal down to the finished or required size. Each pair of rolls is driven, so that in the process of rolling, the plate or bar whilst being rolled may be passed through one, two, or more pair of rolls at the same time, the speed of each pair of rolls being such as is necessary to compensate for the extension or elongation of the plate or bar as it passes from one pair of rolls to another.

Other rolls may be added in perpendicular or angular positions.

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 23.—N° 2376.

PRICE, JAMES.—" Improvements in the permanent way of " *railways.*"

"The invention relates to a peculiar system or mode of forming " the joints of ordinary bridge rails or other flat-bottomed rails " employed on railways, applicable either to new lines or to " existing lines where such rails are employed. According to " this invention it is proposed in forming the joints of bridge or " flat-bottomed rails to employ a wrought-iron chair of a sufficient width to contain the flanges of the rail and receive the " fastening bolts which secure the chair to the sleeper, such bolts " passing through the chair, but not through the flanges of the " rail, the edges of which they touch or nearly touch when in " their places. . . . . A washer plate is laid upon each side of " the chair, and projects some distance over the rail flanges at " the joint or abutting ends of the rails, so that the bolts which " are passed through these plates and through the chairs will, " when screwed up tight, compress the washer plates firmly " down upon the rail flanges, and thereby hold the rail ends " securely in their places."

"It is also proposed as a further improvement in the joints of " bridge rails, to use, in combination with the arrangement above " described, a dowel of compressed or uncompressed wood, which " is driven tightly into the hollow of the rails at the joints, " half the dowel being enclosed in each rail."

[Printed, 8*d*. Drawing.]

A.D. 1861, October 4.—N° 2476.

HUGHES, Edward Thomas.—(*A communication from Laurent Rigolier.*)—" Improvements in the permanent way of railways."

The invention consists "in forming each chair with a large " bed plate, having inclined edges on the outside to prevent the " accumulation of water or sand. One of the cheeks of the chair " is moveable, and so formed that the rail rests upon it between " the cheeks. The lower part of the said moveable cheek fits a " groove in the bed plate, and is pressed up by a key or wedge " so as to force the moveable cheek against the rail, and hold it " fast. Under the bed plate there are strong ribs for the purpose of obtaining strength, and to prevent the chair from " shifting in the ground. Connected to each chair there is a bar " extending across the line in order to hold the two opposite " chairs firmly at the proper distance apart, and some of the " chairs are provided with long cheeks acting as splints to allow " of the junction of the rails."

[Printed, 6*d*. Drawing.]

A.D. 1861, October 10.—N° 2538.

CLARK, William. — (*A communication from Henri Nicolas Rogé.*)—" Improvements in apparatus for bending iron rails or " bars."

" This invention relates to an apparatus for straightening and " bending iron of all sections while in a cold state, both flat and " edgewise, in one operation."

The bending is done by sets of three or five rolls rotated by gearing, and brought near or separated by screw motion.

" The form of the cylinders or rollers may be modified according to the shape of the iron to be worked. An apparatus to be " used in railroad workshops is mounted on four wheels, so as " to be easily moved on the line."

[Printed, 8*d.* Drawing.]

A.D. 1861, October 11.—N° 2541.

RICHARDSON, Robert.—(*Provisional protection only.*)—" Improvements in the manufacture of railway fastenings, and a " mode of preparing rails and fish plates to receive them."

The invention consists " in the manufacture of spikes, bolts, " and screws used as fastenings for rails and fish plates on railways by rolling into shape and cutting them without the aid of " a second heating, and also in an improved manner of preparing " rails and fish plates to receive the said spikes, bolts, and screws " by punching the holes of the rails and fish plates in a conical " shape with any number of sides not less than three."

[Printed, 4*d.* No Drawings.]

A.D. 1861, October 19.—N° 2616.

DE BERGUE, Charles.—" Improvements in sleepers, chairs " for the permanent way of railways."

The improvements comprise " the casting or forming sleeper " chairs with a dished or curved, and hollowed, or flatly tapered " base or bottom (to be used with the convex or projecting side " downwards) with cross ribs or webs, or with one or more circular or other ring like ribs or webs, or with a rib or ribs in " addition to such ring like rib or ribs within the upper concave " side of such bed plate."

" Also the casting or forming sleeper chairs with parts of the " ribs or webs *fashioned* for forming a seat for the rail, on which

" the rail may be firmly bedded, and so that the rail and sleeper " chair may be secured together by one fastening only."

"And also the casting or forming sleeper chairs with ribs or webs " or projections from the convex or lower side of such sleepers, " so as to admit of the adaptation and fastening of the tie bar to " the under side of the sleeper, and securing it thereto by means " of the same bolt or fastening which secures the rail above."

[Printed, 10*d*. Drawing.]

A.D. 1861, October 23.—Nº 2652.

DAVIES, GEORGE. — (*A communication from Barzillai Coat Smith.*)—" Improvements in railways, and in iron pavements and " railways combined, parts of which improvements are applicable " to the construction of railway chairs, and to cast-iron pave- " ments for ordinary streets."

"Firstly," this invention consists "of a railway composed of " two or more cast-iron girders, constructed and bedded directly " into the ground so as to dispense with the usual wooden " sleepers or other foundations, as well as with the ordinary " chairs and spikes.

The girders have ribs on their under surfaces and a rib or rail for the wheels on their upper parts. They are laid lengthwise and jointed together and tied. In trams the surfaces are roughed.

"Secondly, in combining cast-iron girders as above (bedded " into the ground) with malleable iron rails, for the purpose of " readily removing and replacing the rails without displacing the " girders, and in confining the said rails to the girders. On the " upper surface of the girder, and at suitable distances apart, are " cast lugs or projections, between which fits the rib of a single- " headed rail, a strip of wood or other suitable material being " interposed between the under side of the rib and the surface of " the girder, and a wedge-formed key driven transversely through " the lugs and the rib of the rail." A modification of this improvement is applicable to chairs, in which the rail is held by the jaws abutting under the head. The chair is in halves jointing together under the rail.

"Thirdly, of a combined railway and pavement, constructed so " that the wheels of ordinary vehicles can freely traverse the " *pavement* without being obstructed by the rails, the said pave- " *ment* being so arranged that any portion may be readily removed

" without disturbing the whole pavement or raising the adjacent " parts."

[Printed, 1*s*. Drawings.]

A.D. 1861, October 24.—N° 2660.

CAMPBELL, ALEXANDER FRANCIS.—" Improvements in rail- " ways."

The improvements consist in applying a central rail along the line of way adapted to receive or act on suitable wheels between the bearing wheels of the carriages, for the purpose of preventing the carriages running off the line of way, by which wheels with a plain or unflanged surface may be used as the bearing wheels.

[Printed, 6*d*. Drawing.]

A.D. 1861, November 18.—N° 2897.

POUILLET, CHARLES MARIE.—(*Provisional protection only.*) —" An improved mode of constructing and fixing the rails of " railways."

First, in the construction and employment of a rail, with a rib formed on the under side, and inserted in a groove cut in a sleeper, with flanges projecting from the base of the rail, but above the rib, and resting on the upper part of the sleeper; keys are used for securing the rail to the sleeper or wood screws, or other means may be adopted for this purpose. The junction of the rails is effected by flanged fish plates tightened up by bolts. It is preferred that this junction should take place between two sleepers brought close together and resting on the same table or bed, but the union may be effected on the sleeper itself, in which case the flanges must be made so as to enable them to be bolted on each side of the sleeper. Sometimes, for the sake of economy, short sleepers are employed between those extending across the line.

This system is capable of modification. The way may be laid with rail and sub-rail, the whole forming a rail as above described. The ways of the sub-rail may also be secured to the sleeper with a base plate under them.

[Printed, 10*d*. Drawings.]

A.D. 1861, November 29.—N° 3009.

ELLIS, THOMAS.—" Certain improvements in rails for perma- " *nent ways.*"

In making rails, as regards transverse section, of a peculiar "form, the rail being made hollow, or what is termed a bridge "rail, but rolled in such manner that the base, or each side of "the rail will meet or nearly so in the vertical centre line or plane "of the rail, thereby making a more solid bearing on the longitudinal timbers, the object being to prevent the sides of rail "collapsing, a defect which in some cases" is obviated by "introducing a flat bar of iron between the bridge of the rail."

[Printed, 6*d*. Drawing.]

A.D. 1861, December 13.—N° 3133.

QUANTIN, Pierre.—"Manufacturing moulded earthen or "stoneware cross sleepers for superseding wooden ones in the "construction of railways."

"The cross sleepers can be made of various sizes and shapes to "suit the rails of different descriptions; they are composed of "two blocks of earthern or stoneware moulded to an uniform "shape, which two blocks are united together by an iron rod of "suitable strength. Thicknesses of felt or any other similar compressible texture are inserted betwixt the blocks of earthenware "and connecting iron rod or bar; the chairs are placed over the "rod or bar and the whole is bolted fast together to form cross "sleepers ready to receive the rails."

[Printed, 6*d*. Drawing.]

A.D. 1861, December 21.—N° 3211.

SELBY, Fraser.—"Improvements in boilers for the generation "of steam in engines, for applying steam for motive power purposes, and in wheels and ways for steam carriages to run on."

Part of this invention relates to the "wheels of locomotive and "traction engines and the tramway for them to run on. The "rim of the wheel is made of an inverted V shape, with or without "flat side rims, so as to run on a tramway or not; the rails are in "the form of tubes of wrought or cast iron, or of a half circle, by "which means the engine will gain more tractive power than "with ordinary flat rails. Where no tramways are used a flange" is fixed "on both or either side of the wheels, which may be called "a flange wheel of smaller diameter than the other part of the "rim, so that when the engine runs over soft ground it will bear "on the flanges as well as on the wheels, and, lastly, on the rim

" of the wheel" are fixed " at convenient distances apart, plates,
" by preference in the form of horse-shoes, to give greater power
" to the forward motion of the engine, and thereby prevent
" slipping."

[Printed, 2s. 2d. Drawings.]

A.D. 1861, December 30.—N° 3253.

EDWARDS, John.—(*Provisional protection only.*)—" Improve-
" ments in the permanent way of railways."

" Making railway chairs with an opening sufficiently wide to
" take the head of the rail;" filling pieces are placed in the channels of the rail, and the rail is then dropped into the opening in the chair, and is held fast with or without wedging. The invention also consists in making projections on the sides of the rails which fill up the opening in the chair, and the rail is held fast with or without wedging. Also in placing a cushion of suitable material in the bottom of the chair, so that the concussion is broken whilst a train is passing, and the bottom of the rail prevented from being injured. Also in making the spike or bolt holes in railway chairs obliquely, instead of perpendicular as at present.

[Printed, 4d. No Drawings.]

1862.

A.D. 1862, January 14.—N° 102.

HUGHES, Ebenezer William.—" Improvements in mal-
" leable cylinders and tubes used in engineering and architectural
" structures."

" This invention, being equally applicable to the permanent
" way of railways as well as to structures in general," " consists
" in constructing cylinders or tubes suitable for columns or sup-
" porters, by forming and combining plates of wrought or mal-
" leable iron, each of which is rolled with two outer projecting
" flanges, which are produced at angles greater than a right
" angle to the plane or outer surface of the plate." These flanges are joined together by rivets.

[Printed, 8d. *Drawing.*]

A.D. 1862, January 18.—N° 135.

STEVENS, James John.—" Improvements in 'point' indi-" cators for railways."

"The invention is intended to indicate to the person in charge " of the working of the points, when such points are at a distance " from him, the proper action or otherwise of the points which he " desires to work."

The patentee says, " For this purpose I erect at the side or " opposite to the points a pillar, on the upper part of which there " is a diaphragm of any desired shape divided into two parts, " capable of being separated and of being brought close together. " I make by preference the lower part of the disc movable, while " the upper part is stationary. By a chain or bar I connect the " movable part to a wheel or pulley at the bottom or lower part " of the pillar, and to this wheel I also connect a rod attached to " the 'fly' rail. The point is worked by the attendant through " chains, wires, or rods, by means of a pull-over lever in the " ordinary manner, and upon the 'fly' rail being brought in contact with the main rail the parts of the disc are separated or " are closed, according to the manner in which the indicator is " set to act." " In order to render this a night as well as a day " indicator, I erect at the back of the disc a lamp with colored " glasses, which may be made by showing a different color, or by " not showing any light at all to indicate that the points have " acted properly or the reverse. In some cases I make my indi-" cator double, that is to say, I cause it to face both to the " attendant and to the driver of the train, and thus indicate to " both parties in opposite directions at the same time."

[Printed, 10*d*. Drawing.]

A.D. 1862, January 21.—N° 151.

KNIGHT, John Adams. — (*A communication from Hiram Carpenter.*)—" Improvements in the permanent way of railways."

"The object of the invention is to connect the cross-ties, " sleepers, or pedestals, and chairs and rails, in such a way that " they will constitute a complete and well-secured system without " the intervention of any " fastenings " whatever, and it consists " in fitting the cross-ties and pedestals together with a socket or " lock joint, and in combining them with chairs that conform to " the section of the rails, and hold them securely, without the

" usual taper keys or wedges. To prevent the injury incident to " the concussion upon a perfectly rigid support, india-rubber " or other elastic material" is interposed "between the parts in " such a manner that it is easy of access, and permits the adjust- " ment of the track without disturbing the pedestals or ballasting " of the roadway."

The chair base fits on the top of the pedestal with a socket, in which is placed the packing.

[Printed, 8*d*. Drawing.]

A.D. 1862, January 23.—N° 179.

YATES, Henry.—(*Provisional protection only.*)—"Improve- " ments in machinery for bending, repairing, or renewing defective " or damaged parts of iron rails."

"On a suitable bed frame, table, or block, two dies shaped " according to the form of rail or bar to be operated upon, are " arranged," one or both being movable. These dies "are for " the purpose of gripping or retaining the damaged or defective " portions of the rail or bar while in a highly heated state, and " reducing it by pressure to its original and natural form, as well " as for holding any other portion of the rail or bar while the " process of welding is carried on, with a view to renew any part " of the surface." "The dies or jaws may be actuated by levers, " eccentrics, or any other means."

[Printed, 4*d*. No Drawings.]

A.D. 1862, January 28.—N° 227.

IRLAM, William.—(*Provisional protection only.*)—"Improve- " ments in the construction of railway crossings and turntables."

These improvements relate more particularly to the crossings described in the inventor's Specification No. 2694 of 1855, and consist "in securing the steel or wrought-iron plates to the " foundation plate of the crossing, by casting them together."

"The plates are moulded in the sand with the foundation plate, " they are then removed and heated, and replaced in the mould " into which the molten iron is run in the usual manner. By " this means the plates are firmly united with and adhere to the " foundation plate, thus dispensing with the bolts or rivets here- " tofore requisite."

The improvement in turntables "is applicable to those turn- " tables which are made with cast-iron revolving platforms or

" tops, and it consists in chilling or hardening that part of the " table top on which the wheels of the engine and carriages run, " so as to dispense with the rails which are usually bolted on the " table top, thereby increasing the strength and durability and " avoiding the working loose of the rails."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 3.—N° 288.

CLARK, WILLIAM.—(*A communication from Heinrich Sperl, Richard Hagen, and Wolfgang Springer.*)—" Improvements in " processes for preserving and colouring wood, denominated " xylochromic and xyloplastic processes."

The patentee describes processes for colouring, preserving, and hardening wood, and rendering it non-inflammable, increasing its durability, and injecting it, to render it fit for use as railway sleepers, and for other purposes.

[Printed, 8*d*. Drawing.]

A.D. 1862, February 7.—N° 328.

CLARK, WILLIAM.—(*A communication from Henri de Lapparent.*)—" Improvements in preserving timber, which are parti- " cularly applicable to the timbers of ships or other maritime " structures."

"This invention consists in a peculiar arrangement for car- " bonizing large wooden constructions, such as the hull of a ship. The wood is first deprived of its sap by endosmose action, it is then dried and carbonized on its surface by gas jets.

This invention is also used for charring railway sleepers.

[Printed, 8*d*. Drawing.]

A.D. 1862, February 7.—N° 328*.

CLARK, WILLIAM.—(Disclaimer and memorandum of alteration of Lapparent's Specification), filed June 22nd, 1863, for " Improvements in preserving timber, which are particularly " applicable to the timbers of ships or other marine structures."

The assignees disclaim the whole of the first, second, and fourth claims, also part of the third. The invention as it now stands is *for* "the method of carbonizing wood by the aid of a jet of " *inflammable* gas of any suitable nature which is projected on "the wood in position, which process is especially applicable to "the hulls of ships."

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 14.—N° 397.

DODSON, Arthur John.—(*Provisional protection only.*)—"An improved composition for coating, covering, or protecting "ships' bottoms; applicable also for coating or covering railway "sleepers, telegraphic wires, and other surfaces, and likewise as a "cement, and as a substitute for metal for certain constructive "purposes."

"The invention consists in the manufacture of a composition, "suitable for the forgoing purposes, by combining pulverised "slate with vegetable or mineral pitch."

"The proportions recommended are:—Two-thirds slate to one-"third pitch," and sometimes tar is combined with the pitch.

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 19.—N° 440.

ADAMS, William Bridges.—"Improvements in springs, and "their arrangement for moving and stationary purposes."

"Abutment keys of spring steel or elastic metal, to hold rails "in chair," two forms of keys are shewn, "to give a firm flat "bearing against the chair jaw, which holds the rail."

"Another form of the elastic key" is a "straight or slightly "curved bar driven in between the rounded chair jaw, and a "hollowed casting which presses against the rail." By this mode "any requisite tightness may be provided for without leaving it "to the discretion of the workmen to overdrive the key, which is "not a wedge, but of parallel thickness."

[Printed, 10*d.* Drawing.]

A.D. 1862, February 24.—N° 498.

NEWTON, William Edward.—(*A communication from Raymond French and William Goddard.*)—"Improvements in the "joints or chairs of the permanent way of railways."

This invention "consists in shrinking the iron chair to the rails "at their joint, and thus preserving the whole surface bearing of "the chair and rails, and making an extremely solid and firm "joint without the necessity of keys or wedges for holding the

"The invention relates to a peculiar system or mode of forming "the joints of ordinary bridge rails or other flat-bottomed rails "employed on railways, applicable either to new lines or to "existing lines where such rails are employed. According to "this invention it is proposed in forming the joints of bridge or "flat-bottomed rails to employ a wrought-iron chair of a sufficient width to contain the flanges of the rail and receive the "fastening bolts which secure the chair to the sleeper, such bolts "passing through the chair, but not through the flanges of the "rail, the edges of which they touch or nearly touch when in "their places. . . . . A washer plate is laid upon each side of "the chair, and projects some distance over the rail flanges at "the joint or abutting ends of the rails, so that the bolts which "are passed through these plates and through the chairs will, "when screwed up tight, compress the washer plates firmly "down upon the rail flanges, and thereby hold the rail ends "securely in their places."

"It is also proposed as a further improvement in the joints of "bridge rails, to use, in combination with the arrangement above "described, a dowel of compressed or uncompressed wood, which "is driven tightly into the hollow of the rails at the joints, "half the dowel being enclosed in each rail."

[Printed, 8*d*. Drawing.]

A.D. 1861, October 4.—Nº 2476.

HUGHES, Edward Thomas.—(*A communication from Laurent Rigolier.*)—"Improvements in the permanent way of railways."

The invention consists "in forming each chair with a large "bed plate, having inclined edges on the outside to prevent the "accumulation of water or sand. One of the cheeks of the chair "is moveable, and so formed that the rail rests upon it between "the cheeks. The lower part of the said moveable cheek fits a "groove in the bed plate, and is pressed up by a key or wedge "so as to force the moveable cheek against the rail, and hold it "fast. Under the bed plate there are strong ribs for the purpose of obtaining strength, and to prevent the chair from "shifting in the ground. Connected to each chair there is a bar "extending across the line in order to hold the two opposite "chairs firmly at the proper distance apart, and some of the "chairs are provided with long cheeks acting as splints to allow "*of the* junction of the rails."

[*Printed, 6d.* Drawing.]

A.D. 1861, October 10.—N° 2538.

CLARK, William. — (*A communication from Henri Nicolas Rogé.*)—" Improvements in apparatus for bending iron rails or " bars."

" This invention relates to an apparatus for straightening and " bending iron of all sections while in a cold state, both flat and " edgewise, in one operation."

The bending is done by sets of three or five rolls rotated by gearing, and brought near or separated by screw motion.

" The form of the cylinders or rollers may be modified according to the shape of the iron to be worked. An apparatus to be " used in railroad workshops is mounted on four wheels, so as " to be easily moved on the line."

[Printed, 8*d*. Drawing.]

A.D. 1861, October 11.—N° 2541.

RICHARDSON, Robert.—(*Provisional protection only.*)—" Im" provements in the manufacture of railway fastenings, and a " mode of preparing rails and fish plates to receive them."

The invention consists " in the manufacture of spikes, bolts, " and screws used as fastenings for rails and fish plates on rail" ways by rolling into shape and cutting them without the aid of " a second heating, and also in an improved manner of preparing " rails and fish plates to receive the said spikes, bolts, and screws " by punching the holes of the rails and fish plates in a conical " shape with any number of sides not less than three."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 19.—N° 2616.

DE BERGUE, Charles.—" Improvements in sleepers, chairs " for the permanent way of railways."

The improvements comprise " the casting or forming sleeper " chairs with a dished or curved, and hollowed, or flatly tapered " base or bottom (to be used with the convex or projecting side " downwards) with cross ribs or webs, or with one or more cir" cular or other ring like ribs or webs, or with a rib or ribs in " addition to such ring like rib or ribs within the upper concave " side of such bed plate."

" Also the casting or forming sleeper chairs with parts of the " ribs or webs fashioned for forming a seat for the rail, on which

" the rail may be firmly bedded, and so that the rail and sleeper " chair may be secured together by one fastening only."

"And also the casting or forming sleeper chairs with ribs or webs " or projections from the convex or lower side of such sleepers, " so as to admit of the adaptation and fastening of the tie bar to " the under side of the sleeper, and securing it thereto by means " of the same bolt or fastening which secures the rail above."

[Printed, 10*d.* Drawing.]

A.D. 1861, October 23.—N° 2652.

DAVIES, GEORGE. — (*A communication from Barzillai Coat Smith.*)—" Improvements in railways, and in iron pavements and " railways combined, parts of which improvements are applicable " to the construction of railway chairs, and to cast-iron pave- " ments for ordinary streets."

"Firstly," this invention consists "of a railway composed of " two or more cast-iron girders, constructed and bedded directly " into the ground so as to dispense with the usual wooden " sleepers or other foundations, as well as with the ordinary " chairs and spikes.

The girders have ribs on their under surfaces and a rib or rail for the wheels on their upper parts. They are laid lengthwise and jointed together and tied. In trams the surfaces are roughed.

"Secondly, in combining cast-iron girders as above (bedded " into the ground) with malleable iron rails, for the purpose of " readily removing and replacing the rails without displacing the " girders, and in confining the said rails to the girders. On the " upper surface of the girder, and at suitable distances apart, are " cast lugs or projections, between which fits the rib of a single- " headed rail, a strip of wood or other suitable material being " interposed between the under side of the rib and the surface of " the girder, and a wedge-formed key driven transversely through " the lugs and the rib of the rail." A modification of this improvement is applicable to chairs, in which the rail is held by the jaws abutting under the head. The chair is in halves jointing together under the rail.

"Thirdly, of a combined railway and pavement, constructed so " that the wheels of ordinary vehicles can freely traverse the " pavement without being obstructed by the rails, the said pave- " ment being so arranged that any portion may be readily removed

" without disturbing the whole pavement or raising the adjacent " parts."

[Printed, 1*s*. Drawings.]

A.D. 1861, October 24.—N° 2660.

CAMPBELL, ALEXANDER FRANCIS.—" Improvements in rail- " ways."

The improvements consist in applying a central rail along the line of way adapted to receive or act on suitable wheels between the bearing wheels of the carriages, for the purpose of preventing the carriages running off the line of way, by which wheels with a plain or unflanged surface may be used as the bearing wheels.

[Printed, 6*d*. Drawing.]

A.D. 1861, November 18.—N° 2897.

POUILLET, CHARLES MARIE.—(*Provisional protection only.*) —" An improved mode of constructing and fixing the rails of " railways."

First, in the construction and employment of a rail, with a rib formed on the under side, and inserted in a groove cut in a sleeper, with flanges projecting from the base of the rail, but above the rib, and resting on the upper part of the sleeper; keys are used for securing the rail to the sleeper or wood screws, or other means may be adopted for this purpose. The junction of the rails is effected by flanged fish plates tightened up by bolts. It is preferred that this junction should take place between two sleepers brought close together and resting on the same table or bed, but the union may be effected on the sleeper itself, in which case the flanges must be made so as to enable them to be bolted on each side of the sleeper. Sometimes, for the sake of economy, short sleepers are employed between those extending across the line.

This system is capable of modification. The way may be laid with rail and sub-rail, the whole forming a rail as above described. The ways of the sub-rail may also be secured to the sleeper with a base plate under them.

[Printed, 10*d*. Drawings.]

A.D. 1861, November 29.—N° 3009.

ELLIS, THOMAS.—" Certain improvements in rails for perma- " *nent ways.*"

In making rails, as regards transverse section, of a peculiar
" form, the rail being made hollow, or what is termed a bridge
" rail, but rolled in such manner that the base, or each side of
" the rail will meet or nearly so in the vertical centre line or plane
" of the rail, thereby making a more solid bearing on the longi-
" tudinal timbers, the object being to prevent the sides of rail
" collapsing, a defect which in some cases" is obviated by
" introducing a flat bar of iron between the bridge of the rail."

[Printed, 6*d*. Drawing.]

A.D. 1861, December 13.—N° 3133.

QUANTIN, Pierre.—"Manufacturing moulded earthen or " stoneware cross sleepers for superseding wooden ones in the " construction of railways."

"The cross sleepers can be made of various sizes and shapes to " suit the rails of different descriptions; they are composed of " two blocks of earthern or stoneware moulded to an uniform " shape, which two blocks are united together by an iron rod of " suitable strength. Thicknesses of felt or any other similar com- " pressible texture are inserted betwixt the blocks of earthenware " and connecting iron rod or bar; the chairs are placed over the " rod or bar and the whole is bolted fast together to form cross " sleepers ready to receive the rails."

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SELBY, Fraser.—" Improvements in boilers for the generation " of steam in engines, for applying steam for motive power pur- " poses, and in wheels and ways for steam carriages to run on."

Part of this invention relates to the " wheels of locomotive and " traction engines and the tramway for them to run on. The " rim of the wheel is made of an inverted V shape, with or without " flat side rims, so as to run on a tramway or not; the rails are in " the form of tubes of wrought or cast iron, or of a half circle, by " which means the engine will gain more tractive power than " with ordinary flat rails. Where no tramways are used a flange" is fixed " on both or either side of the wheels, which may be called " a flange wheel of smaller diameter than the other part of the " rim, so that when the engine runs over soft ground it will bear " on the flanges as well as on the wheels, and, lastly, on the rim

" of the wheel" are fixed "at convenient distances apart, plates,
" by preference in the form of horse-shoes, to give greater power
" to the forward motion of the engine, and thereby prevent
" slipping."

[Printed, 2*s.* 2*d.* Drawings.]

A.D. 1861, December 30.—N° 3253.

EDWARDS, John.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

" Making railway chairs with an opening sufficiently wide to " take the head of the rail;" filling pieces are placed in the channels of the rail, and the rail is then dropped into the opening in the chair, and is held fast with or without wedging. The invention also consists in making projections on the sides of the rails which fill up the opening in the chair, and the rail is held fast with or without wedging. Also in placing a cushion of suitable material in the bottom of the chair, so that the concussion is broken whilst a train is passing, and the bottom of the rail prevented from being injured. Also in making the spike or bolt holes in railway chairs obliquely, instead of perpendicular as at present.

[Printed, 4*d.* No Drawings.]

1862.

A.D. 1862, January 14.—N° 102.

HUGHES, Ebenezer William.—" Improvements in malleable cylinders and tubes used in engineering and architectural " structures."

" This invention, being equally applicable to the permanent " way of railways as well as to structures in general," " consists " in constructing cylinders or tubes suitable for columns or supporters, by forming and combining plates of wrought or malleable iron, each of which is rolled with two outer projecting " flanges, which are produced at angles greater than a right " angle to the plane or outer surface of the plate." These flanges are joined together by rivets.

[*Printed, 8d. Drawing.*]

A.D. 1862, January 18.—Nº 135.

STEVENS, James John.—" Improvements in 'point' indi-" cators for railways."

"The invention is intended to indicate to the person in charge " of the working of the points, when such points are at a distance " from him, the proper action or otherwise of the points which he " desires to work."

The patentee says, " For this purpose I erect at the side or " opposite to the points a pillar, on the upper part of which there " is a diaphragm of any desired shape divided into two parts, " capable of being separated and of being brought close together. " I make by preference the lower part of the disc movable, while " the upper part is stationary. By a chain or bar I connect the " movable part to a wheel or pulley at the bottom or lower part " of the pillar, and to this wheel I also connect a rod attached to " the 'fly' rail. The point is worked by the attendant through " chains, wires, or rods, by means of a pull-over lever in the " ordinary manner, and upon the 'fly' rail being brought in con-" tact with the main rail the parts of the disc are separated or " are closed, according to the manner in which the indicator is " set to act." " In order to render this a night as well as a day " indicator, I erect at the back of the disc a lamp with colored " glasses, which may be made by showing a different color, or by " not showing any light at all to indicate that the points have " acted properly or the reverse. In some cases I make my indi-" cator double, that is to say, I cause it to face both to the " attendant and to the driver of the train, and thus indicate to " both parties in opposite directions at the same time."

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"The object of the invention is to connect the cross-ties, " sleepers, or pedestals, and chairs and rails, in such a way that " they will constitute a complete and well-secured system without " the intervention of any " fastenings " whatever, and it consists " in fitting the cross-ties and pedestals together with a socket or " *lock joint*, and in combining them with chairs that conform to " the section of the rails, and hold them securely, without the

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The chair base fits on the top of the pedestal with a socket, in which is placed the packing.

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YATES, Henry.—(*Provisional protection only.*)—" Improve- " ments in machinery for bending, repairing, or renewing defective " or damaged parts of iron rails."

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[Printed, 4*d*. No Drawings.]

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IRLAM, William.—(*Provisional protection only.*)—" Improve- " ments in the construction of railway crossings and turntables."

These improvements relate more particularly to the crossings described in the inventor's Specification No. 2694 of 1855, and consist "in securing the steel or wrought-iron plates to the " foundation plate of the crossing, by casting them together."

"The plates are moulded in the sand with the foundation plate, " they are then removed and heated, and replaced in the mould " into which the molten iron is run in the usual manner. By " this means the plates are firmly united with and adhere to the " foundation plate, thus dispensing with the bolts or rivets heretofore requisite."

The improvement in turntables " is applicable to those turn- " tables which are made with cast-iron revolving platforms or

" tops, and it consists in chilling or hardening that part of the " table top on which the wheels of the engine and carriages run, " so as to dispense with the rails which are usually bolted on the " table top, thereby increasing the strength and durability and " avoiding the working loose of the rails."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 3.—N° 288.

CLARK, William.—(*A communication from Heinrich Sperl, Richard Hagen, and Wolfgang Springer.*)—" Improvements in " processes for preserving and colouring wood, denominated " xylochromic and xyloplastic processes."

The patentee describes processes for colouring, preserving, and hardening wood, and rendering it non-inflammable, increasing its durability, and injecting it, to render it fit for use as railway sleepers, and for other purposes.

[Printed, 8*d*. Drawing.]

A.D. 1862, February 7.—N° 328.

CLARK, William.—(*A communication from Henri de Lapparent.*)—" Improvements in preserving timber, which are parti- " cularly applicable to the timbers of ships or other maritime " structures."

"This invention consists in a peculiar arrangement for car- " bonizing large wooden constructions, such as the hull of a ship. The wood is first deprived of its sap by endosmose action, it is then dried and carbonized on its surface by gas jets.

This invention is also used for charring railway sleepers.

[Printed, 8*d*. Drawing.]

A.D. 1862, February 7.—N° 328*.

CLARK, William.—(Disclaimer and memorandum of alteration of Lapparent's Specification), filed June 22nd, 1863, for " Improvements in preserving timber, which are particularly " applicable to the timbers of ships or other marine structures."

The assignees disclaim the whole of the first, second, and fourth claims, also part of the third. The invention as it now stands is for "the method of carbonizing wood by the aid of a jet of inflammable gas of any suitable nature which is projected on

" the wood in position, which process is especially applicable to " the hulls of ships."

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 14.—N° 397.

DODSON, Arthur John.—(*Provisional protection only.*)— " An improved composition for coating, covering, or protecting " ships' bottoms; applicable also for coating or covering railway " sleepers, telegraphic wires, and other surfaces, and likewise as a " cement, and as a substitute for metal for certain constructive " purposes."

"The invention consists in the manufacture of a composition, " suitable for the forgoing purposes, by combining pulverised " slate with vegetable or mineral pitch."

"The proportions recommended are :—Two-thirds slate to one- " third pitch," and sometimes tar is combined with the pitch.

[Printed, 4*d.* No Drawings.]

A.D. 1862, February 19.—N° 440.

ADAMS, William Bridges.—" Improvements in springs, and " their arrangement for moving and stationary purposes."

" Abutment keys of spring steel or elastic metal, to hold rails " in chair," two forms of keys are shewn, " to give a firm flat " bearing against the chair jaw, which holds the rail."

" Another form of the elastic key " is a " straight or slightly " curved bar driven in between the rounded chair jaw, and a " hollowed casting which presses against the rail." By this mode " any requisite tightness may be provided for without leaving it " to the discretion of the workmen to overdrive the key, which is " not a wedge, but of parallel thickness."

[Printed, 10*d.* Drawing.]

A.D. 1862, February 24.—N° 498.

NEWTON, William Edward. — (*A communication from Raymond French and William Goddard.*)—" Improvements in the " joints or chairs of the permanent way of railways."

This invention " consists in shrinking the iron chair to the rails " at their joint, and thus preserving the whole surface bearing of " the chair and rails, and making an extremely solid and firm " joint without the necessity of keys or wedges for holding the rails and chairs together." In carrying out the invention, the chair is to be heated and driven on the end of one rail, and the end of the next rail may then be driven into the other end of the chair, which, when cool, will contract and hold both rails firmly in their place.

[Printed, 6*d*. Drawing.]

A.D. 1862, March 7.—N° 610.

REVELL, JOSEPH.—(*Provisional protection only*.)—"Improvements in securing the rails of railways and tramways to the chairs."

The rail is secured to the chair "by means of an improved key, "wedge or packing." The packing is made to fit tightly in a hollow or sunken bed in the key, and also to project a little from the surface of the key pressing firmly against the rails. "On the "side of the key pressing against the chair, the upper part may "be in contact, or quite free, without any packing whatever; but "in the lower part" is sunk "a rebate or groove, and in connection with it a sunken bed of dovetail or other suitable shape, "into which is placed a locking or tieing key previous to the main "key being driven between the rails and chair. The said locking "or tieing key may be made of wrought iron, zinc, lead, or other "suitable metal or material, but lead" is preferred, "as being the "most suitable material on account of its specific gravity, and "being less liable to decay or loss in value than any other metal. "After the main key has received the packing in the hollow or "sunken bed, and also the tieing or locking key, it may then be "driven into its place in the same manner as the ordinary wedges "are driven." The locking key ends are then bent against the chair.

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 14.—N° 709.

MUIR, MATTHEW ANDREW, and McILWHAM, JAMES.—"Improvements in railway sleepers and chairs, and in the mode "of fixing rails."

improved sleeper is cast in the form of a disc. There is
al boss, or raised part, which forms a base from which
r jaws spring; this part of the sleeper is cast thicker
other portion, and below it is further strengthened by

" a transverse rib, which extends across the under side of the
" boss, and has formed on it a feather, which is immediately
" under the centre of the rail, and which fits a notch in the bar.
" . . . . The sleepers, when laid upon the rails, are connected
" by means of transverse tie bars, which extend a little beyond
" the centre of the sleeper, and this part of the tie bar is notched,
" to fit the feathered part of the central rib of the sleeper. The
" tie bar is fastened to the sleeper by a saddle bolt, which passes
" up through the disc, and is secured thereto either by a nut or
" split key."

"The second part of the invention refers to a mode of fixing
" rails in the chairs. Under one modification, as applied to
" double-headed rails, the rail is placed in the chair bearing
" against the parallel face of the inner jaw, and between the
" other face of the rail and the contiguous jaw is placed a bolster
" piece. . . . . The outer face of the bolster piece is formed
" with a central recessed part, and the ends which form the bearing
" surfaces for the key are curved, or they may form plane
" surfaces extending in an angular direction from the ends of the
" bolster piece towards the recessed part in the centre. The inner
" face of the contiguous jaw of the sleeper is cast to a figure
" corresponding to the opposite face of the bolster piece, and a
" curved key is driven in between the jaw and the bolster piece.
" . . . . When the key is driven in, its curved surface presses
" against the corresponding parts of the bolster piece, and the
" rail is thus tightly wedged up between the parallel faces of the
" bolster piece and the inner jaw of the chair. . . . . The same
" general arrangment or mode of fixing is also applicable to rails
" supported by the head of the rail resting on the jaw of the
" chair and bolster piece. . . . . The bearing surfaces which
" press against the ends of the rails being parallel, cannot interfere
" with the expansion or contraction of the rail arising from
" changes of temperature, neither can this motion in either
" direction affect the security of the joint."

[Printed, 1*s*. Drawing.]

A.D. 1862, March 15.—N° 719.

GRANT, John.—" Improvements in the construction of portable
" railways, and in the trucks or carriages to be used thereon."

"The rails are secured upon longitudinal wooden sleepers, of
" *convenient length* for a man to carry. The ends of these

“ sleepers are provided with tongues and sockets, so that they “ may be fitted together and the ends be thereby supported “ reciprocally when a heavy weight passes over them. The proper “ width between the rails may be maintained by means of trans- “ verse tie rods bent up at their ends, so that they may be inserted “ in holes or sockets made in the longitudinal sleepers for the “ purpose; and these transverse rods may be provided with “ carrying pullies for supporting a rope, if it be desired to work “ the railway trucks by means of stationary engines. Crossings, “ or turn-outs, are made of separate pieces, curved or otherwise, “ according to the particular kind of crossing required. A turn- “ out at or near a right angle” “ may be made with one curved “ piece in combination with a moveable or swivelling straight “ piece, which will form part of the direct track, but is capable “ of turning on its centre, like a turntable, when required.”

The ground is prepared for the sleepers by means of ploughs.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1862, March 18.—Nº 751.

DUNN, THOMAS. — “ Improvements in the construction of “ bridges, roofs, houses, and other structures.”

The invention “consists in certain improved modes of con- “ structing beams, girders, bridges, roofs, fences, ship sides, and “ other structures, and in the application of such improved beams “ and girders, and of beams and girders of the ordinary construc- “ tion in an improved manner.”

“And for the purpose of rendering” the “invention more “ clearly understood, and easy to carry into operation,” the Patentee has “annexed one hundred and four sheets of draw- “ ings.”

The following are the claims he makes :—

“ First, the use of rolled iron and steel of the various new sec- “ tions shewn when used in the construction of bridges, roofs, “ houses, and other structures, and the various modes of applying “ double-headed and other railway bars in such structures.”

“ Secondly, in constructing lattice beams, girders, and other
“ of iron or steel with ribbed bars,” he claims “ the
v or indenting the ribs at the crossings to form
the purpose of relieving the strain on the rivets.”
nstructing” them “of flat bars of iron or steel,”

he claims "the interlacing of such bars for relieving the strain on "the rivets and increasing the lateral and tensile strength of the "structure."

"Fourthly, the improved plate beams and girders, with lattice "work or pilasters or ornamental work at one or both sides."

"Fifthly, the improved modes of constructing and erecting "bridges without the aid of centres or under scaffolding."

"Sixthly, the improved suspension bridges, and the land ties "for the same."

Seventhly, he claims the "compound suspension and girder "roofs," "particularly applicable for roofs of wide spans."

"Eighthly, the improved modes of securing the ends of the "suspension chains or wire ropes of suspension roofs."

"Ninthly, the improved modes of constructing the roofs of "polygonal buildings."

"Tenthly, the use of sheet of iron or other metal pressed into "the form of brickwork, stones, slates, tiles, or other forms used "in the construction of houses or other structures."

"Eleventhly, the improved compound beams and girders of "timber."

"Twelfthly, the improved modes of constructing gates, fences, "and other similar structures, partly applicable to ventilating "ships and houses."

"Thirteenthly, the improvements in the construction and arrangement of gun boats, floating batteries, and other vessels."

"Fourteenthly, the various improved modes of constructing "armour plates for naval and defensive purposes."

"And, lastly, the improvements in the construction of moveable "land batteries."

[Printed, 2*l*. 13*s*. Drawings.]

A.D. 1862, April 3.—N° 943.

TOOGOOD, ROBERT MOORE, and LAYBOURNE, JOHN.—"An improvement in railway crossings."

"This invention consists in forming welded cast steel crossings by welding Bessemer or ordinary cast-steel rails from the "point of the V or heart piece to the intersection of the two "rails."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 10.—N° 10[illegible].

BLACK, [illegible] (*Provisional protection* [illegible].)—"[illegible] "provements in swing bridges adapted for [illegible] "railways and other ways."

The bridge is so constructed that it shall [illegible] swung from its original transverse position [illegible] position between the two lines of permanent way. [illegible] further arranged [illegible] fold up into smaller [illegible] swung out of position. The two girders forming [illegible] supported by and [illegible] on two posts or [illegible] two lines, the [illegible] being fixed out of the [illegible] "one to the right hand and the other pillar to the [illegible] "diagonally with respect to the railways." The [illegible] bridge is movable, and consequently on the bridge [illegible] on the [illegible] the two girders approach [illegible] in a parallel [illegible].

[illegible]

A.D. 1862, April 15.—N° 1083.

[illegible], [illegible] (*A communication from* [illegible]) (*Provisional protection only.*)—"An improved [illegible]

[illegible]

"[illegible] two wrought-iron plates [illegible] [illegible] is made rectangular [illegible] [illegible] the upper plate, which [illegible] [illegible] but so that its [illegible] [illegible]. These plates are [illegible] [illegible] which forms a pivot for [illegible] [illegible] the chair is to be fixed [illegible] [illegible] in the plates, and is [illegible] to support the chair. "The [illegible] forming up portions of the "[illegible] angles. By this means each "plate is [illegible] with a jaw, which jaws "with the [illegible] pairs that are intended "[illegible] in the chair. Between [illegible] iron, clamping pieces [illegible] of the rail are placed, and [illegible] inserted therein they will [illegible]tion."

The jaws of the chair are closed upon the clamps or upon the " rails by turning the upper plate upon its centre," and then fixing it and the lower plate by pins to the sleeper.

[Printed, 4*d.* No Drawings.]

A.D. 1862, April 16.—N° 1111.

ASHBURY, John.—"Improvements in the permanent way of " railways."

An improved mode of securing the rails. "It is proposed to " use a rail having the ordinary bearing flange at its upper sur- " face, but with a slightly tapered or wedge-shaped web in trans- " verse section, the narrowest portion of the rail being at its lower " edge. This rail is dropped into a chair, the inner surfaces of the " jaws of which are made to approach each other towards the " lower portion of the chair, thus presenting a tapered or wedge- " shaped opening or trough for the reception of the correspond- " ingly tapered web of the rail, which fits it accurately at the sides. " Any heavy weight passing over the rail will tend to force it " down into its chair, and will, consequently, still further tighten " it therein without the necessity for keys or wedges of any kind." Wood packing may be placed under the rail in the chair, if " desired." The rails may be prevented from rising from their " chairs by pins or bolts passing transversely through the rail " and jaws of the chair, a ring or collar serving to prevent the " accidental displacement of the bolt, but in some cases these " bolts or pins may be dispensed with. The joint chairs are made " like the intermediate chairs, but wider, and a bolt or pin is " passed through the two jaws and through an opening made " between the rail ends, so that one bolt will serve to hold down " both rail ends. It is preferred "to form these chairs by rolling " them from wrought-iron plates, but they may also be made of " cast iron if desired."

[Printed, 8*d.* Drawing.]

A.D. 1862, April 17.—N° 1133.

CLARK, William. — (*A communication from Jean Baptiste Delrieu.*)—"Improvements in the manufacture of railway rails," consisting in methods for "the acieration or mixed cementation " of the upper parts of the casings of rail which constitute the " principal face of the rails." They consist in protecting the rails by coverings of sheet iron, or by simple contact of their surfaces instead of using earths or slags.

[Printed, 6*d.* Drawing.]

A.D. 1862, April 23.—Nº 1181.

PRICE, JAMES.—(*Provisional protection only.*)—"Improvements " in spikes for railways and other purposes, and in the mode of " manufacturing and securing the same."

This invention "consists in manufacturing an ordinary solid " spike or pin, and then splitting it longitudinally for a greater " or less portion of its length by means of a circular saw or " shears. . . . . The two limbs or halves thus formed are bevelled " inwards at the point, which causes their opening or separation " when driven into the sleeper or other timber. In order, however, " to insure with greater certainty the opening of the split end of " the spike or pin," it is proposed "to use a small iron, metal, or " hard wood wedge or cone, which is dropped into or inserted in " the hole to receive the spike, which hole is to be bored to about " the depth to which the solid portion of the spike will reach " when driven home, and upon which the bevilled end of the " spike is driven, such wedge or cone serving effectually to open " or separate the split. In drawing the spike this wedge or cone, " which has previously been forced up the extreme end of the " split is generally drawn out with it, so that the extra width " given to the split portion of the spike must be drawn through " the small aperture formed by the neck of the spike or unsplit " portion."

[Printed, 4*d.* No Drawings.]

A.D. 1862, May 3.—Nº 1313.

HEPPEL, JOHN MORTIMER.—(*Provisional protection only.*)— " Improvements in the construction of the permanent way of " railways."

One part of the invention "relates to that description of per- " manent way where double-headed rails and the ordinary 'chairs' " are employed. Longitudinal sleepers are constructed" either of wrought iron or "puddled steel, the traverse section of which " is formed of a trough shape, with a flange on either side of the " trough. These longitudinal sleepers are placed opposite to each " other on the road, each opposite pair being connected together

" and kept to guage by means of wrought-iron tie bars or rods." It is preferred " to form these tie rods of flat bar iron, placed on " edge between the sleepers, and with the ends twisted round so " as to lie in a flat position across the sleepers, the extreme ends " being bent into a hooked form, so as to lay hold of the outer " flange of each sleeper; the inner flange of the sleeper is " attached to the bar by means of a strap or staple passing " round the latter (which has a notch formed for that purpose), " and through a hole in the flange, being secured at the under " side of the same by means of a split cotter. Any other suit- " able form of tie rod and manner of fixing the same to the " longitudinal sleepers may, however, be employed."

The inventor also constructs a road with longitudinal sleepers of corrugated iron or steel, the rails being secured to them and tied by T-shaped or other tie bars.

[Printed, *4d.* No Drawings.]

A.D. 1862, May 7.—N° 1372.

MARCHAL, DÉSIRÉ, and DE WIART, ADRIEN CARTON.— " An improved method of preventing the destructive effects of " vibration or jar on the permanent way of railways, and on the " wheels, axletrees, and other parts of carriages, and the working " and other parts of machinery liable to shocks."

" The invention consists in the application to those parts which " are liable to shocks of a band plate, washer, or lining of lead, " tin, zinc, copper, or an alloy of these metals, or either of them. " It is applicable to the rails and chairs of the permanent way of " railways, and to the axletrees of engines and carriages, ... " and to various parts of machinery, and to the bearings of iron " bridges. By thus interposing a soft and elastic metal between " two hard metals or surfaces, the injurious effects of concussion " will be greatly reduced."

[Printed, *1s.* Drawings.]

A.D. 1862, May 9.—N° 1389.

D'AUBRÉVILLE, LÉOPOLD.—(*A communication from Pierre Quentin.*)—" Improvements in metalic cross sleepers for railways."

" The improved railway metallic cross sleepers are composed " of two plates or sheet iron pieces about ten inches wide, fifty " to fifty-four inches long, and from two to three-eighths of an

" inch thick, the edges of the said plates are bent at right angles, " so as to form flanges to the longest sides of the plates, these " flanges being turned downwards. Two holes are punched " through the plates to correspond to those of the cast-iron " chairs for the bolting or fastening of the said chairs. A piece " of wood about four inches thick is inserted betwixt the plate " and chair, and they are bolted fast together (this wooden sole " must be the same size as the seat or sole of the chair, or a little " longer). Two chairs adjusted in the same manner are connected " together by means of a flat iron bar of a suitable thickness and " the required length for the breadth of the way."

[Printed, 8*d*. Drawing.]

A.D. 1862, May 13.—N° 1445.

BROOMAN, RICHARD ARCHIBALD,—(*A communication from Jean Antoine Lanzirotti and Paul Gemelli.*)—(*Provisional protection only.*)—" An improved means or apparatus for shunting " trains."

" The object of this invention is to enable a train to be shunted " or moved from one line of rails to another without the aid of an " attendant. The invention consists in fitting to the front or side " of locomotives, tenders, or carriages in front of a train, a projecting rod or rods which comes or come in contact with a " weighted lever or levers on the rail, which, through the medium " of rod or chains, draw the points together and cause the course " of the train to be diverted."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 15.—N° 1467.

DICKER, JOHN.—" Improvements in apparatus for the delivery " of bags or parcels from railway chains in motion."

" To the near side of the railway carriage is attached one " or more projecting arms from which the bag or parcel to be " delivered is suspended. When the bar or parcels have been " delivered, these projecting arms are drawn up close against the " side of the carriage by means of a counter-balance weight inside. At the corresponding side of the railway there is erected " an upright receiving standard and framework furnished with " *diverging* lines to disengage the bag or parcel from the projecting arm, As soon as the bag or parcel leaves the projecting

" arm it is received upon an inclined platform which conducts it " down behind the standard clear of the rails."

[Printed, 8*d*. Drawing.]

A.D. 1862, May 28.—N° 1609.

RANSOME, James Allen.—" Improvements in the manufac- " ture of and in fastening railway chairs with wood trenails."

" For these purposes wood trenails are made, and are com- " pressed, and are allowed to cool or set in moulds or dies in " which they are compressed as heretofore; they are then drilled " longitudinally from the head towards the point, but the lower " part or point is left solid in order to admit of its being driven " into a sleeper without injury. It is preferred that the hole thus " drilled into a wood trenail should be cylindrical in order to its " receiving a cylindrical metal spike, which should, as nearly as " may be, fit the interior of the hole closely without requiring any " considerable force to drive it in, it being desirable that the " spike should derive its principal holding by the expansion of " the trenail after it has been driven. It is desirable that the " wood trenails made with solid points or lower ends as above " described should be driven by the aid of a tool with a hollow " face (corresponding with the curvature of the upper surface of " the head of the trenail) which is placed on the top of the trenail " when it is being driven. The tool is made with a projection " on its under side which fits the upper part of the hole in the " trenail. In using these trenails to fasten railway chairs to " sleepers, the treenails are driven in through the holes in the base " of each chair into the sleepers; the spikes are then introduced " into the holes formed in the trenails, so that when the trenails " expand in use the spikes will be more and more securely held, " and the chairs will be better fastened to the sleepers than when " using metal spikes alone, or wood trenails alone."

[Printed, 6*d*. Drawing.]

A.D. 1862, June 4.—N° 1677.

PERRY, Archibald Hewison.—" Improvements in fastenings " and in the method of fastening together or securing railway " chairs and sleepers, and for other similar purposes."

" Instead of employing the ordinary solid or compressed wooden " *trenails alone*, and instead of using iron spikes of any con-

" venient shape or form alone, for securing iron chairs to the " wooden sleepers of railways, as is now commonly practised," the patentee says, " I take a wooden trenail, either turned parallel with " a head or shoulder. or with any suitable amount of taper, and I " bore a hole along its axis; I also take an iron spike or round " metal pin with a head, and I flatten it at some distance above " the point; but I prefer to leave the point cylindrical, so that " there is a square shoulder formed on two sides by the flattenings. " For the purpose of fastening iron chairs upon wooden sleepers, " I first bore the sleeper or other substance, and then drive the " hollow wooden trenail through the hole in the chair and into " the wooden sleeper to the required extent; I then drive the " spike or pin into the hollow trenail, which is thereby expanded " at its lower end, and thus forms a dovetail within the wood, " which will prevent the trenail from being withdrawn from the " sleeper, as also the spike or pin from being withdrawn out of " the trenail."

[Printed, 8*d*. Drawing.]

A.D. 1862, June 4.—N° 1680.

JAMES, William.—" Improvements in bolts, spikes, and nails, " and in apparatus for their manufacture."

" In making bolts, spikes, and nails of round spiral-grooved " rods, and in a peculiar apparatus for producing the twist in the " rod during the process of manufacture."

"The metal rods of which these articles are manufactured are " first rolled with one or more straight grooves or channels."

"To give the required spiral direction to the grooves or channels the rods are afterwards twisted, and finally, the spikes, " bolts, or nails are headed in the usual manner."

[Printed, 6*d*. Drawing.]

A.D. 1862, June 4.—N° 1687.

PRESTON, Frederick Philip, and GOODMAN, Charles. —(*Provisional protection only*.)—" Improvements in the permanent way of railways."

" The rail is put in a chair of suitable shape, and on one side is " inserted a cheek-piece, which has a projection fitting in a suitable slot made in the chair, to prevent its lateral movement." When the cheek-piece is in its place, " a wedge is inserted in a

" hole formed by two slots, one in the side of the chair and the " other in the side of the cheek-piece. On driving in the wedge," the cheek "presses against the rail, and holds it rigidly in the " chair. To prevent the wedge getting loose, a cotter or split key " is driven in a slot made therein, and the ends of the cotter " opened out."

Another mode of securing the wedge is by a screw and nuts.

[Printed, 6*d*. Drawing.]

A.D. 1862, June 5.—N° 1694.

BELL, James. — "Improvements in fastenings for railway " chairs."

"This invention relates to an improved metallic spike, to be " substituted for the trenail or fastening by which railway chairs " are ordinarily secured upon their sleepers."

"According to one modification," it is "made of a piece of " sheet iron, which is bent or shaped in dies or moulds into a " tubular form, with a conical enlargement, forming the head. " The edges of the metal are not brought quite close together, " but are left slightly apart, so that the spike may be slightly " compressed on being driven home, and its consequent tendency " to re-expand will give it a firmer hold in the sleeper."

"According to another modification, the edges of the sheet " metal may be made to slightly overlap each other; or, again, " the spike may be made out of a tube, one end whereof is ex- " panded, to form the head, being slit a short distance to admit of " the widening, if necessary. The spike may be made of various " proportions, and of metal of various thicknesses; but in ordi- " nary cases the diameter of the shank will be about one inch " and an eighth, and the thickness of the metal about three- " sixteenths of an inch."

[Printed, 8*d*. Drawing.]

A.D. 1862, June 13.—N° 1756.

HASELTINE, George. — (*A communication from Benjamin Morison.*)—(*Provisional protection only.*)—" Improvements in the " construction and application of rails for railways."

The invention consists "in dividing the metal used in making " the ordinary single-bar flange rail into two separate or distinct " parts, which for clearness of description may be termed respec-

" tively the 'wearing rail' and the 'supporting rail,' and combin-
" ing them together in distinct horizontal planes, or parallel with
" each other by means of intermediary plates or blocks, in com-
" bination with clamping hooks or their equivalents, arranged
" and secured at equal distances apart from each other, and also
" in such uniform relation to the previously determined distances
" apart of the cross-ties or ground sills used for the foundation
" of the said combined rails, as to bring the points of attachment
" or application to the said cross-ties or ground sills at such parts
" only of the 'supporting rail' as will be midway between each
" pair respectively of said combined plates and clamps, for the
" purpose of producing a compound rail that will be, when laid,
" at least equal in strength to the ordinary single-bar flange rail,
" as the same is now laid to form a track and a track surface,
" having a uniform elasticity and strength throughout, under
" such loads as are now carried on railways by steam as the
" motive power."

The invention further consists "in securing each of the joints " which occur at the abbutting or contiguous ends of the said " 'wearing rails,' by means of a longer intermediary plate in " combination with clamping hooks or their equivalents, the " said plate being arranged along between the 'supporting rail' " and the abutting or contiguous ends of the 'wearing rails,' so " as to be, together with the said joint, midway between two " adjacent cross-ties or ground sills, for the purpose of giving to " this part of the track the same general elasticity, and, at least, " the same equality of strength, which are characteristics of the " other portions of the same."

[Printed, 4*d*. No Drawings.]

A.D. 1862, June 20.—N° 1814.

JEFFRIES, William.—(*Provisional protection only.*)—"A new " or improved rail for railways, and a new or improved chair or " sleeper for the said rail."

The improved rail "consists of a bar of wrought iron or steel, " the upper part of which resembles the upper part of an ordi- " nary rail, and the lower part consists of a shank or bar, the ' sides of which are parallel. The rail in cross section has a figure somewhat resembling the letter T, excepting that the top or upper part is thick and rounded like the head of an ordinary rail."

The new chair or sleeper "is made of rolled or cast iron, and " consists of two upright parallel plates or bars upon a base, the " lower part of the before described rail fitting in the space " between the two parallel plates. Cross-bolts, pins, or cotters, " passed through the chair or sleeper and rail, secure the rail in " its place. Iron of the form described may be used in short " lengths separated from each other, after the manner of chairs, " or it may be used in long continuous lengths, so as to constitute " sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 2.—N° 1926.

JAMES, John.—"An improved mode of welding railway " crossings."

"The invention consists in heating the rails or plates in a reverberatory or other furnace or fire, in placing them in moulds " according to the sections of the rails or plates, which moulds are " used as ordinary top and bottom tools, and in welding them " under a Nasymth's steam hammer or other like suitable hammer, " or otherwise welding them in a press or squeezer."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 8.—N° 1964.

RUSSELL, Joseph, junior.—(*Provisional protection not allowed.*) —"An improved arrangement and method of indication to be " employed in railway and other timetables."

"This invention is particularly adapted to railway timetables " but it is also applicable to other timetables, and is designed to " render such tables or 'guides' more clear and intelligible, and " also to economize space therein. The improvements consists " in the use and application of stripes, dots, commas, or other " marks or signs to any or all of the division lines now employed " to separate the rows of figures denoting the time. For example, take the departure of a train consisting of one or two " classes of carriages; this is denoted by two marks or signs " upon the division line, and the numerals usually employed for " the purpose are discarded, and consequently the space they " occupy is saved; then if an extra class is added to the train at " a future station it can be indicated at the point of addition by " a mark, when a numeral would only tend to confuse instead of " instruct."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 12.—N° 2014.

COCHRANE, William Erskine.—" Improvements in railway " fastenings."

" For these purposes, when using plates with studs or projec- " tions thereon corresponding with the holes made in the ends " of rails such as are usually formed for receiving screw bolts of " fish plates, the plates are each made in such manner that they " have as many studs or projections as there are holes made in " the ends of two rails, which is not new; but in place of making " the outer surface of such a plate as heretofore, it is formed with " a projecting incline on that part which comes within and below " the top of the outer jaw of a joint chair in which the ends " of the two rails are to be fixed and retained by the plate. In " addition to such incline there are two other projections formed " near the upper part of the plate, so as to come (when the plate " is in its place in the chair) on either side of the outer jaw of " the chair and near its top. These projections form stops which " prevent the plate and also the rails sliding longitudinally within " the chair. Between these two projections or stops there are " formed projecting ribs which do not extend so far out from the " outer surface of the plate as the stops, and it is between these " ribs that the wedge is driven."

The plate is secured by a grooved wedge, which grooves may hold a nail or pin to retain the wedge in position.

"In making fastenings for intermediate chairs there are no " pins or projections formed on the inner surfaces of the plates, " and such plates are shorter, but like those used in a joint " chair they have the raised inclines to receive the wedges, also " the projecting stops to come on either side of the jaws of the " chairs, and also the ribs and means of retaining the wedges " secure."

To secure the bolt heads, a perforated plate is placed over them and held on by strips of flexible metal.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1862, July 15.—N° 2031.

COUVREUX, Alphonse.—" An improved centrifugal appa- " ratus for casting stones and other materials, and in forming " embankments and other structures."

" The invention relates to an apparatus for throwing stones or " any other earthy matter required for the formation of embank-

" ments, dykes, and breakwaters, &c. A large wheel" is used, " which revolves at a very high speed, on which are placed a " series of paddles or buckets; the stones are conveyed into the " inside of the frame by means of a shoot, and are taken up by " these paddles or buckets and thrown off at a tangent through " another shoot, which can be elevated or lowered according to " the distance they are required to be thrown; the whole is " mounted on a wooden frame; the wheel is driven by means of a " pulley and strap from an engine, or any other convenient motive " power."

[Printed, 8*d*. Drawing.]

A.D. 1862, July 30.—N° 2156.

NOCK, George.—(*A communication from Joseph Wood.*)—" A " new or improved safety or moveable self-acting crossing for " railways."

The ends of the rails on either side of the crossing point or frog " have a slight motion about a centre or point at the chair, " six feet, more or less, distant from the ends of the rails. The " two ends of the rails are clipped and bolted together to suit the " curve of the road, and sufficient play is left in the chair and in " the holes through which the spikes pass, to allow of the slight " motion required. When the flange of the carriage wheel comes " in contact with the guard rail, the carriage wheel on the " crossing point or frog presses the moveable rails outwards, to " accommodate the curve of the line."

" The periphery of the wheel thereby obtains a greater bearing."

[Printed, 6*d*. Drawing.]

A.D. 1862, July 30.—N° 2158.

GEDGE, William Edward.—(*A communication from Louis Eugène Jamet and Paul Jamet.*)—" Improved means or apparatus " for securing the safety of trains moving on railways."

" The apparatus consists, firstly, in a third or safety rail; and " secondly, in two friction rollers, turning horizontally on each " side of the safety rail." " As regards the third, or safety rail, " which is laid down on wooden sleepers at curves (or other dangerous parts of the permanent way) between the ordinary rails, " and is elevated slightly above them. Near the extremities, and " to permit the introduction of the flange of the rollers, it has its

" lateral faces brought nearer together, giving to the rail at its " spring the shape of a wedge; or the upper shoulder may gra- " dually die away. The safety rail starts before the curve begins, " in order that the train may travel on it before the locomotive " arrives at the curve; or it may be used along the whole line of " railway. In the second means the centre or safety rail is dis- " pensed with, a modification being made in the ordinary rails, by " which the wheels of the carriage and the base or block of the " safety brake are made to rest on a return, provided with a " shoulder, which fulfils the office of the safety rail before men- " tioned.

[Printed, 1*s*. Drawing.]

A.D. 1862, August 1.—N° 2181.

BIDDELL, GEORGE ARTHUR. — " Improvements in railway " crossings."

" These improvements have reference to the construction and " manufacture of 'chilled' cast-iron railway crossings, for which " a patent was granted to the inventor in 1855, No. 2113."

" It has been found that when the chilling of the upper wearing " surface of the crossings is carried quite up to the rail ends of " the crossing, the extreme end edges of the chilled wearing " surfaces are liable to chip or break off in small fragments, from " the weight and action of the wheels of the engines and carriages " running over such crossings." The 'point' is also liable to similar inconvenience.

" Now, the object is to remedy the defects and inconvenience " above set forth. This " it is proposed " to do by preventing " the chilling action taking place quite up to the extreme ends or " point of the upper wearing surface of the erossings. This will " leave the parts which have been found liable to chip and break " off less brittle, more tough, and much less liable to chip or " break than when chilled at those parts, as heretofore. This " effect is produced by the proper use of 'cores' or sand, or other " suitable material, in connection with the iron or chill, producing " portions of the mould previous to casting the crossings."

[Printed, 8*d*. Drawing.]

A.D. 1862, August 12.—N° 2264.

BOWER, JOHN.—(*Provisional protection only.*)—" Improvements " in railway sleepers."

"This invention relates to a new form of iron railway sleeper "which it is proposed to make with a V-shaped section, with a "flange at the top of each arm, to which flanges the rail is to be "fastened with bolts" or otherwise, "whilst the angular base of "the sleeper will rest in ballast in the usual way."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 19.—N° 2325.

FALKINER, Travers Hartley. — "Improvements in the "permanent way of railways."

"An improved mode of securing the fish plates or other con-"trivances for connecting the rail ends together, which consists "in forming upon the ends of the bolts employed two screwed "portions or lengths, the one being of larger diameter than the "other, and the threads on each portion being in reverse direc-"tions, the one portion being a right and the other a left-hand "thread. On each of these portions a nut corresponding to it is "screwed, that on the inner screwed portion serving as the "ordinary or tightening nut, whilst that on the outer portion "(which is of lesser diameter) being screwed in the reverse "direction, serves the combined purposes of jamming the inner "nut, and of counteracting the tendency of the bolts to turn "loose."

[Printed, 8*d*. Drawing.]

A.D. 1862, August 22.—N° 2344.

BARRETT, William. — "Improvements in casting railway "sleepers and chairs where tie-bars are used."

"The improvements are applicable when casting chairs which "have hollow inverted sleepers similar to those known as Greaves', "through which, when in use, tie bars are passed and secured "by keys. When making a mould for the casting of a chair "and sleeper of this description, cores are used to produce the "requisite holes in the castings for the passage of the tie bars."

"In place of making the core for the purpose of producing the "hole, it is, according to this invention, made in two parts; one "part is of iron and the other of sand. The portion which is of "iron is (when covered with loam) moulded in the upper box on "the convex surface, which produces the hollow of the sleeper; "the portion which is of sand is produced in the lower box in

" the same manner as the other parts of the mould. Thus it will " be seen that the core is formed complete in the upper and lower " boxes, and has not to be laid in as a separate piece between " the two after the pattern has been drawn, and the mould is " otherwise complete."

[Printed, 10*d.* No Drawing.]

A.D. 1862, August 23.—N° 2354.

EDWARDS, John.—(*Provisional protection only.*)—" Improve- " ments in the permanent way of railways."

" Two angle or other shape iron are placed back to back " with a web between; " this web and angle irons are then rivetted or " bolted together, leaving between the angle irons an opening " about two inches deep," into which " a suitable shaped rail with " a feather on one side " is inserted; " the feather drops into the " opening left between the angle irons, and is bolted to them. " When one head is worn out it can be turned on its side and " used in that position, and when the second heat is worn out " it can be turned on its other side and used in that position, " thus forming a rail with three heads for running, thereby " effecting great economy."

Six different modifications of sleepers constructed of angle iron, &c. in a somewhat similar manner are described.

[Printed, 4*d.* No Drawings.]

A.D. 1862, September 4.—N° 2449.

COLES, Richard Pipes.—" Improvements in the construction " of the permanent way of railways."

The invention relates to an improved railway chair or rather pedestal " made hollow in the upper part, and slightly tapering " upwards in the transverse section; into this hollow are fitted " two wooden wedges, the upper one entirely fitting into the upper " portion of the cavity of the chair, and is forced into its position " by the lower wedge. The chair with its included wedges is " then to be placed at intervals and embedded in concrete of the " ordinary composition, and made level with the upper surface of " the chair, and forming a continuous bearing surface for the " support of any of the well-known flanged rails; through the " flange of the rails screws are passed, securing the rails to the " wedges in the upper portion of the chair; between the flange

" of the rails and the concrete is interposed a continuous surface " of wood or other elastic packing to relieve the concussive " action of the passing load. At intervals wrought-iron tie rods " are made to pass through holes in the two corresponding " chairs, and secured by a nut to prevent the lateral spread of " the gauge."

[Printed, 8*d*. Drawing.]

A.D. 1862, September 12.—N° 2515.

BOWER, John.—(*Provisional protection only.*)—" Improvements " in railway sleepers."

The invention relates to certain new forms of cross sleepers, to be made of " wrought or cast iron or other suitable metal, of " any convenient length for such purpose, and to be in cross " section (trough like), and of a rectangular, triangular, curved, " or angled V-form, or of a section compounded of two or more " of these forms," and " provided with flat flanges or bearing " surfaces projecting at the top edges, and drilled for rivets or " screw bolts, by means of which, passing through these holes " and through corresponding holes in the rail flange, the sleeper and " rail are securely fixed to each other. In the case of the ' double- " 'headed rail' the flanges of the sleepers are fixed by like means " to chairs carrying the rails and bearing on both flanges of the " sleepers."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 12.—N° 2517.

HOWIE, John.—(*Provisional protection only.*)—" Improvements " in the construction of the crossings and switches of railways."

" The parts which are found to give way sooner than the other " portions of the line are those which are contiguous to the " tongue or point rails; at these parts a comparatively short " length of rail is interposed in the line of the ordinary rails, " and forming a continuation of the same. These short lengths " of rail are, by preference, formed of steel or case-hardened " iron, in order that they may wear as long, or nearly as long, as " the rails which are subjected to the ordinary wear and tear of " the line." They " are fastened by means of fish plates, extending " for some distance beyond the abutting ends of the rails, " and are firmly bolted together."

" Another mode of arranging the short rails is to form them in

" two parts, the lower portion of the rail being formed with a
" vertical web or feather, and the upper half being of a saddle-
" like figure, with a recess corresponding to the mid-feather of
" the lower part. The upper portion of the rail is slipped on to
" the lower one, and the two are firmly secured by being bolted
" together by the fish joints. This arrangement admits of the
" upper portion of the rail being easily renewed from time to
" time when worn."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 19.—N° 2573.

COCHRANE, WILLIAM MORSHALL.—(*Provisional protection only.*)—" Improvements in securing the bolts and nuts of railway " fish plates."

"The bolt holes in the fish plates" are made "circular, and at " the outer side of the fish plate" the inventor makes a "notch " or notches in the side of each hole. Between the fish plate and " the nut, and between the fish plate and the head of the bolt" is placed "a washer or thin plate, of such size as to extend " beyond the nut or head. This washer or thin plate has by " preference a projection or projections on its inner side, which " enter the notch or notches formed at the edge of the bolt hole " in the fish plate; or these parts" are so arranged that "the " washer when pressed against the fish plate shall not be at " liberty to turn on the bolt. The nut of the bolt is then " screwed home, the washer or thin plate applied under the head " of the bolt and under the nut is bent at its edge, so that the " bent parts may come respectively against the sides of the head " and nut, by which both the head and the nut will be prevented " turning."

" It is not essential that the bolt head should be secured as " above described, as it may be secured in the usual manner by " means of a groove in the fish plate, or by means of a square " or its stem entering and fitting a square hole in the fish " plate."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 26.—N° 2630.

COCHRANE, WILLIAM MORSHALL.—(*Provisional protection only.*)—" Improvements in securing the bolts and nuts of railway " fish plates."

The nuts and bolts are secured by thin plates of metal "between
" the fish plates and the screw nuts, and also between the fish
" plates and the heads of the screw bolts when the screw bolts
" are not otherwise prevented from turning. These thin plates
" have two holes through them to admit of the two screw bolts
" near the end of a fish plate passing through them. The thin
" plate is of sufficient length to extend beyond the two screw
" nuts which fasten one end of a fish plate to a railway bar, so
" that when the screw nuts have been screwed tightly, the ends
" or the angles of the thin plate are turned away from and at
" right angles to the fish plates, so as to come against one or
" more sides of each of the two screw nuts, by which the nuts
" will be securely held and retained from turning after being
" once well screwed up. In like manner a similar plate is
" placed between the two heads of the two screw bolts which
" are used to fasten one end of a fish plate to a rail when such
" screw bolts are not otherwise prevented from turning. In
" some cases, in place of using a thin plate of a length to extend
" to and fasten two screw nuts, or the heads of two screw bolts
" used in fixing a fish plate, a thin plate is used to each screw
" nut and to each head of a screw bolt, in which case such thin
" plate is retained from turning by a projection at the edge of
" the hole in the thin plate, through which the screw bolt passes,
" the projection of the thin plate entering a hole or recess in
" the fish plates, and when grooved fish plates are used, the
" thin plate is made of a suitable width to fit into the groove
" or recess in the fish plate."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 29.—N° 2647.

ADDISON, JOHN.—"Improvements in moorings or apparatus
" for securing articles, applicable also to the fixing of chairs for
" railways."

"The invention consists in the employment of plates of metal
" of sizes proportioned to the strain likely to be exerted upon
" them, which are placed in pits made in the earth for their
" reception, prepared with a bottom of loose earth, on which the
" plates rest, and into these pits, after the placing of the plates,
" sufficient water is admitted to cover the plates to create a per-

" fect atmospheric pressure." On the upper part of the plates, chairs for holding rails are fixed.

[Printed, 6*d.* Drawing.]

A.D. 1862, October 2.—N° 2666.

JOHNSON, JOHN HENRY. — (*A communication from John Lackland.*)—(*Provisional protection only.*)—" Improvements in " the permanent way of railways."

This relates to an " improved form of railway chair and con- " struction of joint for the rail ends, and consists in casting the " upright jaw of the chair which is on the inside of the rail " separate and distinct from the plinth of the chair, and of a " wedge form. The outer jaw is cast on the plinth in the usual " manner; the upper part of the plinth on the inside of the rail " is made with a raised tablet, which acts as a butt to the wedge " jaw which is inserted between it and the rail, thereby firmly " holding the rail in its position. This wedge jaw is locked by " a screw bolt passing through it and the plinth and screwing " into one oblong wrought-iron nut inserted in the under side " of the plinth. When stone block sleepers are used, the chair " plinth at that part upon which the rail rests is made to receive " a cushion of lead or other suitable material, thus preventing " immediate contact between the rail and the upper part of the " chair plinth. This lead or other cushion is retained in its place " by the moveable jaw of the chair. The chair itself is secured " to the stone block by the screw bolts passing up through the " stone and the plinth of the chair, and a nut screwed on above. " Where tie bolts are employed, their ends may be passed over " the end of the bolts before the nut is screwed on. In using " wooden sleepers, the ordinary method of securing the chair by " a twisted or jagged spike is adopted."

The rails are " plain rabate " jointed.

[Printed, 4*d.* No Drawings.]

A.D. 1862, October 4.—N° 2683.

BILLUPS, JONATHAN EDWIN.—" Fixed points for railways."

" This invention consists in dispensing with the moveable " tongues and switches, and substituting in place thereof fixed " points," with wing or leading rail and check rail, so " arranged " that they will always keep the carriages, engines, or otherwise, " within a proper track."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1862, October 15.—N° 2781.

DE BERGUE, Charles.—" Improvements in the permanent " way of railways."

This invention has especial reference to the inventor's patents, No. 1245, A.D. 1853, and No. 2616, A.D. 1861, in which arrangements were made " to accommodate flat-bottomed rails." It is now proposed to fit double-headed rails. The improvements are,—

" Firstly, in forming the chair or the sleeper with seating for " the rail of a form corresponding with the section of the double-" headed rail, or nearly so, but without the common upright " lugs or jaws, such seating providing a lateral abutment for the " inner side of the lower head of the rail."

" Secondly, in forming the clip-piece so that it shall not only " press upon the upper side of the lower head of the rail, to " prevent the rail rising or jumping, but shall also present an " abutment or resistance, against which the web of the rail shall " bear to maintain the rail in the intended upright position, and " so prevent its tilting over the tail of the clip-piece itself, also " taking a lateral abutment against the chair or sleeper."

" And, thirdly, the use of the foregoing in combination with a " double-headed rail and a single bolt with each clip-piece to " form permanent way."

" And, fourthly, in forming the clip-piece with a portion to " pass under the rail and to bear against the inner side or edge " of its lower head; in this case the tail of the clip-piece resting " upon but not laterally abutting against the chair on the " sleeper."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1862, October 16.—N° 2790.

BARNINGHAM, William.—" Improvements in the permanent " way of railways."

" The invention consists in making railway sleepers, either " transverse or longitudinal, of wrought iron, rolled to a semi-" elliptical or other suitable form, to combine strength with " lightness, and of sufficient area to be firmly supported on the " ballast. The rails are attached by bolts or otherwise to chairs " or half chairs, which are welded, rivetted, or bolted to the

" sleepers, or the chairs may be formed of strips of metal cut " from the top of the sleeper on three sides, and bent into the " required form to suit the shape of the rail. When bridge or " other flat-bottomed rails are employed, they may bear upon and " be connected to the sleepers by bolts or rivets."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1862, October 22.—N° 2847.

HUGHES, Ebenezer William.—(*Provisional protection only.*) —" Improvements in turn-tables and turn-bridges."

" In constructing the fixed circular track on which a turn-table " or a turn-bridge is supported and turns, it is formed with a " hollow groove, and, by preference, of an elliptical cross section, " which groove is between two circular ridges or rails suitable " for the support of wheels." " The under surface of the turn-" table or turn-bridge is made with a similar circular groove. In " the groove of the fixed circular track are placed a number of " spheres on which the groove of the under side of the turn-" table is supported. In the centre of the fixed circular track is " a fixed upright axis, which passes through the centre of the " nave or boss of the turn-table or turn-bridge. Small spheres " are introduced between the upright axis and the hollow centre " of the boss " of the turn-table. " Between the circular fixed " track and the turn-table or turn-bridge there is a circular frame, " which also turns on the central fixed upright axis. This frame " is composed of several radial rods or bars, fixed at their inner " ends to the central boss," and " at their outer ends they pass " through and are affixed in a circular ring, which is of some-" what less diameter than the inner ridge or rail before mentioned " of the fixed circular track, and they extend beyond the outer " circumference of the fixed circular track."

There are wheels on the radial rods, each of which runs in the space between two spheres, which wheels help to support the turntable.

[Printed, 4*d.* No Drawings.]

A.D. 1862, October 28.—N° 2904.

DUNCAN, Charles Stewart.—" An improved compound or material for coating or covering metallic and vegetable substances, to preserve them from corrosion or decay."

"The compound is applicable for protecting and covering
" sheathing of all characters, girders, bridges, balconies, or iron-
" work of all kinds, when exposed to destructive influences, and
" it should be applied to the surface of the metal previous to the
" application of paint or varnish."

"The compound is also applicable to the coating or preserving
" of metallic work of other kinds, and to coating wood and wood-
" work, such as piers exposed to sea water, or to wharves, and
" also to palings, railway sleepers, and telegraph posts, previous
" to their being coated with paint, varnish, pitch, or tar."

The compound is made with marine glue, gutta percha, india-rubber, shellac, copal mastic, or pitch in combination with one or more of the following substances:—"Alumina, schist, quartz,
" slate, silex, or flint, marble, or pozzalano sand, sandstone,
" cement (natural and artificial), chalk, glass, emery, tripoli,
" white oxide of zinc or of lead."

[Printed, 4*d*. No Drawings.]

A.D. 1862, November 8.—N° 3018.

SPRUYT, CHARLES WILLIAM. — "Improvement in rails for
" railways."

"The invention consists in forming rails in two parts, the foot,
" the web, and a shoe in one piece, and the top in another piece.
" The top is shrunk, bolted, or otherwise attached to the shoe,
" and when worn it can be removed, and another top may be
" fixed on the same shoe;" and "in inserting between the shoe
" and the top a layer of lead, hardened rubber, or other material
" softer than iron."

[Printed, 8*d*. Drawing.]

A.D. 1862, November 13.—N° 3063.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Jean Antoine Lanzirotti and Paul Gemelli.*)—"An improved
" means or apparatus for shunting trains."

"The invention consists in fitting to the front or side of
" locomotives, tenders, or carriages, in front of a train, a pro-
" jecting rod or rods which comes or come in contact with a
" weighted lever or levers at the side of the rail, which, through
" the medium of rods or chains, draw the points together, and
" cause the course of the train to be diverted."

[Printed, 8*d*. Drawing.]

A.D. 1862, November 28.—N° 3193.

CLARK, William.—(*A communication from Jules Vautherin.*)—
“ Improvements in the permanent way of railways.”

“This invention relates to the application of T and bridge “ rails as the transverse sleepers of railways, so as to form rail- “ road ways wholly of metal. When using bridge rails,” they are inverted “thereby having the flanges uppermost, to which is “ rivetted a plate of iron, on which the chair” is fixed, “to “ receive double-headed rails. Single-headed rails” are secured “ to the plates by means of what are termed gibs and keys, when “ used for keying connecting rods in machinery. They are “ placed in a vertical position, a gib being placed on each side “ of the rail, the double head of the gibs embrace at bottom the “ plate, and at top the foot of the rail, while the key, being “ afterwards inserted, forces them up and keeps them in position. “ The iron plate before mentioned may have inclined surfaces, so “ as to give the ordinary slant to the rail on the inside, in curves “ or otherwise. When employing chairs, the plate may be fur- “ nished with two ribs rolled on it, on which the rail bears, in “ addition to the chair, thus giving a widely-increased bearing “ surface to the rail. Instead of employing bridge rails, the “ transverse sleepers” may be formed “ of T-iron, the iron plate “ for the support of the rail being rivetted to the head of the T.

The inventor also claims a compound structure of “ undulated “ longitudinal plates” and bridge iron.

[Printed, 1*s*. Drawing.]

A.D. 1862, November 29.—N° 3209.

ANDERSON, John.—“Improvements in the manufacture of “ the tyres of railway wheels, and rails, switches, and crossings “ of railways.”

This invention consists in causing such articles when made of steel or carbonized iron, to be heated to a good or bright red heat, and then quenched or cooled by immersion in oil. “By this “ means the quality of the metal of which the railway tyres, ‘ switches, and crossings are composed, will be greatly in character, and at the same time rendered more for use.”

4*d*. No Drawings.]

A.D. 1862, December 1.—N° 3214.

GRIFFIN, George Featherstone.—" Improvements in the " permanent way of railways."

These improvements refer to the inventor's previous patent N° 1843, A.D, 1861.

" They consist in lowering the rail into the body of the sleepers, " using the curved or lateral arch of the sleeper to support the " rail on one side, and forming jaws or chair arms to support it " on the other, by which means greater strength " is obtained, " and a larger bearing surface to prevent lamination of the rail; " further, the keys being placed inside, should one accidentally " become displaced, there would be no danger of the rail getting " out of gauge." They also consist in " recessing wood in the " lateral arch and in the keys in such manner that the wood " assists in supporting the rail under its head. (The key itself is " supported on a shoulder cast on the inside of the jaw, and " therefore cannot be displaced downwards.) When wood is not " used the rail is supported by the lateral arch itself."

Also, in using in " conjunction with the improved sleepers, a " saddle rail having a convex curve on the under side, thus " obtaining a larger wearing surface with larger flanges. Further, " the convex portion of the rail fitting into a concave bed prevents " any tendency of the rail to roll or turn, and together with " " the system of wedging, does away with the necessity of using " bolts or screws."

Another improvement " consists in a safety rail formed by " bending it at a right or other sharp angle, and so forming it " with two running surfaces on one side. When this rail is laid " on the sleeper, and secured by wedging or otherwise, " while one " of the angles forms the running surface, the other serves as an " edging or flange, and prevents the rolling stock or train from " leaving the rail. When one running surface is worn the rail " is turned, and it in its turn becomes the safety flange."

[Printed, 10*d*. Drawing.]

A.D. 1862, December 2.—N° 3233.

BOUSFIELD, George Tomlinson.—(*A communication from Eugène Smits.*)—(*Provisional protection only.*)—" Improvements " in forming the permanent ways of railways."

"According to this invention the sleepers or bearers are usually "placed transversely across the railway, and the rails are fixed "in chairs, which are fixed by bolts and nuts to the transverse "sleepers or bearers. The chairs may be either fixed directly to "the sleepers or bearers of wood or other suitable packing may "be interposed between the under surfaces of the chairs and the "upper surface of the webs, which comes between the flanges of "the double T or H angle iron of the bearers or sleepers, which "are laid in a horizontal position on the earth. In some cases "the use of chairs may be dispensed with, and the rails be laid "on and fixed directly to the sleepers or bearers of double T or "H angle iron," "and for this purpose the flanges of the "transverse angle iron bearers may be cut away, or turned down "at intervals, or the spaces between the rails and the webs of the "sleepers or bearers may be filled with wood or other packing, "so that the rails may come above the flanges of the bearers or "sleepers."

[Printed, 4*d.* No Drawings.]

A.D. 1862, December 4.—N° 3250.

GRANT, JOHN.—"Improvements in the construction of turn-"tables for portable railways."

"The invention consists in a novel mode of constructing a "very light and portable turn-table, so that it may be easily "moved from place to place, and very easily and quickly placed "in position upon the surface of the ground without requiring to "be let into it, and so that four-wheeled carriages or trucks may "be turned thereon so as to be brought at any required angle to "their former track, and in a line with any one of any number "of branch lines or turn-outs that may be radiating from the "centre of the turntable, so as to be turned completely round in "the direct track."

The turn-table is made up of rings or hoops revolving in grooves upon greased bearings or rollers and connected by short pieces of rail.

[Printed, 8*d.* Drawing.]

A.D. 1862, December 13.—N° 3339.

CORBET, CHARLES.—"Improvements in rails for railways, and "in the mode of forming the joints of the same."

"The invention consists in the use of a bridge rail made wired at its upper part or head than at the lower part above the base, the sides being curved inwards at each part and then curved outwards to form the base. Into the hollow of this peculiar rail there is fitted accurately a correspondingly shaped chair, or chair and fish combined, which enters some little distance into each end of the rail, the peculiar shape of which prevents all chance of lateral or vertical motion at the joint." "It is further proposed to form the chair or chair and fish with a base-plate having raised ribs at each side, for the purpose of preventing any expansion of the base of the rail, the edges of the flanges of which abut against the raised ribs above mentioned."

[Printed, 6*d*. Drawing.]

A.D. 1862, December 13.—N° 3343.

NEWTON, William Edward.—(*A communication from William Henry Dunning.*)—(*Provisional protection only.*)—"An improved mode of and apparatus for repairing the rails, points, switches, and other parts of the permanent way of railways."

"The object of the present invention is to mend or repair the damaged portion of the rail and render it serviceable without being obliged to resort to re-rolling or re-manufacturing the whole rail," by cutting off the surface of the damaged part of the rail and welding on to this part a "flat piece of iron or steel of suitable width and thickness, the operation being performed in such a manner as to form a perfectly level surface from end to end of the rail. As the welding operation requires a high degree of heat, and as the web of the rail is thinner than the tread, the web is liable to be knocked out of shape during the welding process. To obviate this, the rail" is "supported during the welding process in a pair of moveable jaws, which will be made to clasp the web firmly and support the underside of the tread . . . . For bridge or hollow rails it may be necessary to employ a projecting core piece in addition to the supporting jaws . . . . It will, of course, also be understood that points, switches, and other irregular forms require special forms of apparatus, but constructed on the principle of supporting the heated rail under the blows of the hammer."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 23.—N° 3428.

WHITLEY, Joseph, and BURTON, John Watson.—"Im-
" provements in the construction of the permanent way of railways,
" which improvements are also applicable to railway wheels."

"The improvements in the permanent way consist in the
" application of a packing or cushion of wood, paper, or felt,
" between the connecting plates or fishes for connecting the rails
" together, and the rails. These cushions may be compressed and
" chemically prepared, as is well understood, to aid in their
" preservation from the action of damp."

[Printed, 6*d*. Drawing.]

A.D. 1862, December 31.—N° 3482.

ADAMS, William Bridges.—" Improvements in railways and
" tramways."

The improvements are in sleepers, rails, and fishes. The "im-
" proved metal sleepers are of a cast or wrought iron, in short
" lengths, say two feet, more or less, so arranged that they receive
" rails in a deep channel in which they are keyed or otherwise
" fastened, the rails resting on the whole length of the sleepers,
" either on the upper and lower table, or on both combined, with
" or without the intervention of wood, caoutchouc, or other
" similar substances between the rail and sleeper; and the rails,
" when single-headed, are to be rolled with recesses for fishes,
" which may partly enter their sleepers, and the same system is
" applicable to chairs placed on sleepers. In some cases the
" sleepers " are cast " in the form of a T, with the chair bolted
" on it so as to replace the wood sleeper in ordinary use."

"The improved brackets are of cast or wrought iron bolted
" laterally to the rails, with a horizontal bearing surface for the
" ballast or sleepers." The "improved fishes are constructed of
" unusual depth to support the rail joints, and with inside abut-
" ments to the rail tables." The "improved longitudinal timbers
" are cut diagonally to bolt to the rails laterally."

The "elastic permanent way consist in applying continuous
" longitudinal timbers on the ordinary cross sleepers, and placing
" the rails on them in chairs or brackets over the hollow spaces,
" with or without caoutchouc or similar substance."

[Printed, 1*s*. Drawings.]

1863.

A.D. 1863, January 7.—N° 65.

JOHNSON, John Henry. — (*A communication from Alcide Louis Joseph Huber.*)—“ Improvements in the permanent way of “ railways.”

The invention consists “ in using lighter sleepers, whereby a “ considerable saving of time is effected, whilst the proper “ stability of the way is retained by attaching on the upper sur- “ face at those parts where the rails rest or the chairs are secured, “ and which are most liable to decay, extra blocks of oak or “ other durable wood of a sufficient length only to give a firm “ support to the rails.” It is also “ proposed to employ short “ blocks of timber of the ordinary section of sleepers for support- “ ing the rails, or rails and chairs, and to connect these blocks “ by bars of iron, which bars form the intermediate portion of “ the sleeper between the rail bearing surfaces. It has been “ found that ordinary wooden sleepers deteriorate rapidly at the “ rail bearing portions, whilst the intermediate portion of the “ sleeper remains comparatively sound, but it is necessarily lost “ or wasted by reason of the decay in the other parts.”

[Printed, 8*d*. Drawing.]

A.D. 1863, January 22.—N° 196.

GRANT, John.—“ Improvements in the construction of sidings “ and loop lines for railways or tramways, whether portable or “ otherwise.”

The invention consists “ in the first place, in two novel modes “ of constructing a siding so that it may be placed in position at “ any part of the main line, and on either side of it, so as to be “ used for turning carriages out of the main line on to such “ sidings, or from the siding on to the main line by raising or sup- “ porting such trucks or carriages above the rails of the main line “ without the necessity for any cuts or gaps through such rails.” Secondly, in “ the combination of a pair of such sidings con- “ nected by intermediate rails so as to form a loop line.”

“ The ends of the rails of the siding at the junction of the main “ line are made to rest on or above the rails of the main line, and “ are of greater depth or thickness at the point of junction than “ the depth of the flanges of the wheels, so as to admit of the “ free passage of the wheels, including the flanges, over or above

" the rails of the main line." In order to raise the wheels to the level of the siding at the point of junction, or to lower them from the siding, " the rails of the siding are continued from such " point of junction a short distance along the tops of the rails of " the main line, and in the same direction, but in a tapering form, " terminating in a thin edge so as to form a gradual incline from " the lower to the higher level upon which the wheels may be " made to ascend or descend."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 26.—N° 227.

FELL, John Barraclough.—" Improvements in working " railway engines and carriages on steep inclines."

This invention relates to the use of a central rail on railways for the purpose of obtaining adhesion and safety. The inventor does not, however, make any claim to the central rail, but he specifies three claims with reference to the arrangement and working of the adhesion wheels. This invention will accordingly be found described in the series relating to carriages for railways.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, January 27.—N° 236.

ASKEW, Charles.—(*Provisional protection only.*)—" An im- " proved railway chair and joint for rails on railways."

" The chair is constructed in two parts, and each has a head " similar to the jaw of a vice, to fit the rail. One of such parts " has a sliding grove similar to the slide of a slide-rest of a lathe, " and the other has a sliding piece to fit and slide in such groove. " When a single or double headed rail is placed between the " jaws of the chair, it is secured in the required position by means " of one or more bolts passed through one or more holes through " the two parts of the chair, and, if desired, through the rail also " for that purpose, and screwed up securely by means of one or " more screw nuts."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 28.—N° 243.

BARLOW, Henry Bernoulli.—(*A communication from Etienne Marechal.*)—" Improvements in preserving timber, and in appa- " ratus employed therein."

" This invention is particularly applicable to preserving railway " sleepers, but it may be employed for preserving timber for any

" other purpose, and it consists in placing the timber in a closed
" vessel from which the air is exhausted by suitable air pump
" machinery, then subjecting it to the action of a metallic salt,
" and then to the action of tar or other bituminous substance.

"The apparatus consists of three or other convenient number
" of vessels for containing the timber; the vessels are connected
" together, and to two boilers, by suitable pipes, the whole being
" capable of resisting a pressure of six or eight atmospheres.
" The boilers are heated by a furnace or furnaces of the usual
" construction, and one boiler contains a solution of sulphate of
" iron or other metallic salt, while the other contains the tar or
" other bitunimous substance, to which it is necessary to add
" occasionally a certain quantity of mineral oil to keep the tar
" fluid."

The wood is first treated with the salt and then with the tar.

[Printed, 10*d*. Drawing.]

A.D. 1863, February 13.—N° 396.

WHITAKER, Samuel.—" Improvements in indicating the posi-
" tions or conditions of railway signals and points, and in the
" apparatus employed therein."

" It is proposed to connect railway points and crossings with a
" battery, and with suitable contact surfaces, so that when the
" point is opened or closed as the case may be, a circuit will be
" established through a galvanometer, the needle of which will
" indicate the position of the points in connection therewith.
" The same arrangement . . . . is equally applicable for in-
" dicating the position of the day signals. By providing any
" ordinary signal with proper contact points, and connecting such
" points by wires with a battery and galvanometer at an adjoining
" station or intermediate point, the setting of the first signal is
" instantly indicated by the needle to the signal man of the second
" signal."

Night signals may be similarly checked.

[Printed, 10*d*. Drawing.]

A.D. 1863, February 27.—N° 557.

DUDGEON, Arthur, MEAKIN, George Frederick Lee, and ALLEN, Edward Ellis.—" Improvements in the con-
" *struction of underground* railways or subways, and in carriages
" *to be used or worked* therein."

"The main objects of the invention are to avoid in great part " any lengthened interruption of the ordinary traffic during the " construction of such subways, to considerably reduce their " height, and consequently their cost, as also to avoid the possibility of any settlement of the buildings standing along the " sides of the streets or roads under which the said works are " being carried."

According to the invention, the sides and roof of the subway are first constructed, after which the earth is removed from the interior.

[Printed, 1*s*. Drawing.]

A.D. 1863, March 5.—N° 627.

HOWIE, John. — "Improvements in the construction of the " crossings of railways."

"The parts which are found to give way so much sooner than " the other portions of the line are those which are contiguous to " the tongue or point rails of the crossings. At these parts a " comparatively short length of rail is interposed in the line of " the ordinary rails and forming a continuation of the same. " These short lengths of rail are, by preference, formed of steel or " case-hardened iron," and "are fastened by means of fish-" plates extending for some distance beyond the abutting ends of " the rails, and are firmly bolted together; a portion of the bolts " may be passed through both the rails, so as to obtain a very " firm junction, and prevent all rocking or lateral motion of the " rails; the fastening of the parts may, however, be effected in " various ways. In conjunction with these short lengths of hard " metal rails, it is proposed to make the extremities of the tongue " rails in short pieces, fastened by suitable chairs, and extending " backwards a length of four or five feet, and made by preference " of steel or case-hardened iron, so that these parts may wear in " unison with the continuous hard metal rails. Another mode of " arranging the short rails is to form them in two parts, the lower " portion of the rail being formed with a vertical web or feather, " and the upper half being of a saddle-like figure with a recess " corresponding to the mid-feather of the lower part. The upper " portion of the rail is slipped on to the lower one, and the two " are firmly secured by being bolted together by the fish joints. " This arrangement admits of the upper portion of the rail being " easily renewed from time to time when worn."

[Printed, 10d. Drawing.]

A.D. 1863, March 9.—N° 651.

LEA, Charles Henry.—" Improved apparatus for opening and " closing the gates of railway crossings, which apparatus also acts " simultaneously upon the signals."

" The invention is designed for the purpose of preventing " accidents at level crossings, and to enable one person by a " simple movement of a lever to open or close both gates, and at " the same time to set the signals on both the up and down lines " of the railway." " These gates " are mounted " so as to turn " upon footsteps, and each gate " is connected " by a link to the " outer end of a lever capable of vibrating on a fixed centre. " The inner ends of each pair of levers meet in the centre, and " are furnished with slotted eyes, and they are all four connected " together by rods and links running along the 'six-foot way,' so " that they all must act simultaneously. The outer end of one " of the levers is lengthened and is connected by a chain or " chains to two hand levers, one of which being depressed causes " the gates all to open simultaneously, and the other closes them " in a similar manner. By connecting the ordinary semaphore " or other signals on the up and down lines to the levers which " work the gates by means of chains passing round pullies, the " opening of the gates (or closing of them as regards the railway) " will be caused to raise the danger signals on both lines, a spring " or weight bringing the same down as soon as released by the " closing of the gates to the road."

[Printed, 10*d*. Drawing.]

A.D. 1863, March 28.—N° 809.

PERRY, Archibald Hewison.—(*Provisional protection only.*)— —" Improvements in working railway points, switches, and signals, " and in the apparatus to be employed for that purpose."

" The object of this invention is to ensure to the pointsman or " signalman a correct knowledge of the condition of the points " or the signals (or both together when they are connected and " worked simultaneously)."

" For the purpose of insuring the points or the signals being in " the position intended or due to the movement of the lever- " handle by the pointsman, although he may be at a considerable " distance from such signals and from the points," there are applied to each of the points, " and to the face or edge of the rail " into which it is intended the point or tongue is to come in close ' contact, a piece of copper or other suitable conducting metal,

" and by insulating each piece of metallic conducting surface " from the rail or rails and connecting it by means of a wire " with a battery and telegraph instrument, and to the earth, the " perfected contact is signalled on the opening or closing of each " pair of points or switches."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 2.—N° 846.

LAW, JOHN WARREN, and INGLIS, JOHN.—" Improvements " in making moulds for casting, and in apparatus connected " therewith."

"This invention relates to the application of pressure in making " moulds for casting metals, and is applicable principally, " although not exclusively, to articles of a generally cylindrical " or spherical form, the improvements being such as to secure " increased accuracy of form with economy in the labour " required."

"In making a mould for the concave side of a railway sleeper, " or similar article, a convex perforated plate is used, with a rim " round its outer edge, and having a central hole. This plate " being placed with its convexity upwards a pin is fitted in the " central hole, and a frame of sufficient depth being fitted on the " rim sand is filled in, and what is superfluous is removed by a " scraper turning on the central pin; the whole is then brought " under the pattern and pressure applied to give the finishing " shaping action. The convex side of the sleeper with the chair " upon it may be moulded in a similar way, an additional double- " headed rammer being used to give the proper hardness to parts " of the mould. Ordinary railway chairs and other articles may " also be moulded in the same way."

[Price, 1*s*. 2*d*. Drawings.]

A.D. 1863, April 2.—N° 847.

CLARKE, EDWIN FRANCIS.—" Improvements in the means of " fastening rails for railways."

"The improvements relate to the construction of the chairs and " keys." "The chair is formed with a vertical slot tapering down- " wards, and which is cut or formed in the inner faces of the " chair, and extends through the bottom of the same. The keys " are each formed with a head, which fits on the side of the rail " and drops into a recess formed in the chair for that purpose, " and a vertical fin projecting from the outside and extending

" downwards in such a form that when the keys are placed one on " each side of the rail the fins meet underneath, and on being " dropped vertically (in this position) in the chair, the fins ex- " actly fit and completely fill the taper vertical slot in the chair. " The heads of the keys are the same width as the chair, except " at the joint chairs, where they are made wider so as to act as " fish-plates."

The keys are secured with the chair by a pin.

[Printed, 8*d*. Drawing.]

A.D. 1863, April 15.—N° 946.

CLARK, William.—(*A communication from Paulin Gay.*)—(*Letters Patent void for want of Final Specification.*)—" Improvement in apparatus for the transport of goods."

"The apparatus consists of a carriage or platform which may " be constructed of iron, and is furnished at the under part with " small rollers running on rails, which extend in all directions " throughout the storehouses, and wherever the merchandize is to " be conveyed, and especially along quays. These rails are made " portable and possess the advantage of only occupying the way " for a few minutes until the loading is completed, when they are " at once removed without trouble or expense. These rails con- " sist of a kind of ladder, the cross-bars of which are furnished " with iron hooks to prevent the sides from opening, and so to " keep the rails at an invariable width apart. . . . . The plat- " form is set in motion by tackling fixed on board the lighter, " while a windlass placed at the back of the platform, the rope " from which is furnished with a hook for attachment to the " apparatus, regulates its motion towards the lighter. The plat- " form is returned to its original position in the store by simply " winding the rope round the barrel of the windlass in the reverse " direction."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 20.—N° 984.

HUGHES, Ebenezer William.—" Improvements in turn- " tables, turnbridges, and slips."

The turntable is supported on spheres which run in a groove on the underside of the table and in a circular track. Between the latter and the turntable there is a circular frame, which also turns on the central fixed axis.

"The frame is composed of radial rods or bars fixed at their " inner ends to a central boss or nave, and at their outer ends they " pass through and are affixed in a circular ring, which is of " somewhat less diameter than the inner ridge or rail" "of the " fixed circular track, and they extend beyond the outer cir- " cumference of the fixed circular track. There is one such " radial bar or rod in the space between each two neighbouring " spheres of those which support the turn-table or turn-bridge. " On each of these radial rods or bars are two wheels, one to " run on the inner circular ridge or rail, and the other to run " on the outer circular ridge or rail of the fixed circular track. " These two wheels turn freely and independently of each other, " and the circular frame between the fixed circular track and " the turn-table or turn-bridge is supported by them. On each " of the radial rods or bars is a wheel which turns freely on the " rod or bar, and is of a diameter equal or nearly so to the space " between each two neighbouring spheres, so that it touches one " or both of the two spheres between which it is placed, and it " will be turned in an opposite direction to that in which the " sphere in contact with it turns when rolling in the groove in the " fixed circular track. By applying to a turntable or turnbridge, " a combination such as is above described, the table or bridge " will not only be well supported, but it will be found to require " but small power to turn it, although the weight may be great. " In order to prevent accidents which might arise in the event of " a turntable or turnbridge not being in the proper position when " a train passes on to it, apparatus is applied for locking or " securing the turntable or turnbridge when brought correctly " into position, and signal apparatus is provided in order to indi- " cate whether the turntable or turnbridge is properly arranged."

[Printed, 10*d*. Drawing.]

A.D. 1863, April 23.—N° 1009.

RICHARDSON, Robert.—" Improvements in railway perma- " nent way."

The "invention consists in new descriptions of railway sleepers " and a new method of fastening the rails in those sleepers. The " sleepers are constructed of cast and wrought iron or wood, or of " any or all of those materials, in combination with cheeks, jaws, " or chairs arranged in such manner that they receive keys placed " *on both* sides of the rails alternately, or two or more on each

" side of the rails alternately, and by the assistance of those " cheeks, jaws, or chairs, on those sleepers, the rails are held firmly " in place throughout the line, including the joints of the rails, by " a system of alternate keying." The " next improvement con- " sists in new cast or wrought iron chairs or jaws to be attached " to sleepers of such form that the rails are secured by alternate " keying, as before described."

[Printed, 2*s*. 10*d*. Drawings.]

A.D. 1863, May 8.—N° 1150.

SKWARCOW, ALEXANDER.—(*A communication from Signore Rombeaus.*)—(*Provisional protection only.*)—" Improvements in " the construction of turntables."

" This invention consists, firstly, in bolting or rivetting lengths " of railway bars on the underside of the H iron bearers at the " point where the short pieces of the bearers butt against or are " connected to the long pieces, by which means the strength of " the cross bearers is carried through from one side to the other " and the bearers made continuous."

" Secondly, in forming the centre spindle on which the table " revolves of wrought-iron, and of such a form as to allow the " horizontal plane of the table to be out of the square with the " vertical axis of the spindle without bringing any bending strain " on the spindle."

" Thirdly, in forming the oil cup or box in the same piece of " metal as the spindle, and in fixing in the centre of the oil cup " a steel stud, upon which rests another steel stud, which is fixed " to the wrought-iron cap of the table; by this arrangement the " surfaces of contact of these two steel studs are always working " in oil."

" And lastly, in connecting the circular rail with the casting of " the centre spindle by means of round wrought-iron rods."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 9.—N° 1164.

NORIE, JAMES.—" Improvements in making moulds for casting, " and in apparatus therefor."

The mould box is supported by trunnions on a mould carriage, from which it is never detached. The pattern is supported to move in vertical slides. The mould box is brought to the pattern, moulded, moved to have the top box placed on it, further moved to receive the metal, and finally turned over to throw out the casting.

[Printed, 10*d*. Drawing.]

A.D. 1863, May 11.—N° 1180.

VAN TENAC, CHARLES LOUIS.—(*A communication from Jean Arthur Granet.*)—" A new wrought-iron railway sleeper."

"The principal object of the invention is a rolled wrought-iron " sleeper intended to replace the wooden sleepers on the railway " lines. It includes also :—

"1st. The way of filling the inside of the sleeper.

"2nd. The way of fastening the Vignole or Brunel rails on this " sleeper."

"3rd. The cast-iron chair wanted for using the double-headed " rails with this sleeper, and the way of fastening it on to the " sleeper."

"The sleeper is rolled in one piece, and filled inside either with " beton or sand agglomerated with lime, or with sand clay, so as " to obtain a solid body. The choice of material for filling the " sleepers to depend on the nature of the ground, or better, to be " according to the cheapest way found in the country where it is " used."

[Printed, 7*s*. Drawings.]

A.D. 1863, May 19.—N° 1250.

EDWARDS, JOHN.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

The patentee says,—" I fix suitable iron arms to the sides of the " rails " " by means of bolts and nuts, or bolts and cotters; these " bolts I sometimes make hollow to get extra strength; these " bolts I apply to fasten fish plates and other parts of the permanent way. Under the arms I place a wood or other sleeper; " the sleepers pass between the stay and arms which then hold " them in position. Under the rail I pass a brace or stay, which " is fixed to the ends of the arms by bolts and nuts or otherwise. " Under the rail, and inside the brace, I place a filling piece of any " suitable material. When I use iron sleepers, which are made of " angle iron cut to length, I prefer to make the sleepers answer " the purpose of fish plates and sleepers combined: these " sleepers sometimes I form by carrying a thin plate of metal " *from* arm to arm; and to save metal for the arms I use **T** iron

" with holes punched to get the bolts in, but I do not confine " myself to this plan as the arms can be formed in many ways : " tie bars of wood or metal are passed under and bolted to the " sleepers. Also I apply a capping to the rails; this capping is " rolled to fit the head of the rails, and is either bolted, sprung, " or forced on. This capping takes the wear of the rails, and it " is only requisite to renew the capping instead of the whole " rail."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 21.—N° 1269.

HARDING, George Rogers.—" Improvements in the means " of transmitting power on railways worked by vacuum or the " pressure of air, and in the apparatus to be employed for such " purpose."

" This invention consists of a novel arrangement of longitudinal " slots, and the valve or covering or means of affording communication between the piston in the interior of the tube and the " carriage or carriages exterior thereto."

The patentee says—

" Upon the exterior of the tube, and on each side of the longitudinal slot, I cast or fix a bevilled flange, by which means a " V-shaped gutter or channel is formed over and along the " longitudinal slot, and which should be planed true from end to " end for the purpose of receiving V-shaped stoppers, which, " when hinged or connected together by a belt, strap, or web, " form a continuous but flexible bar, by which the longitudinal " V-shaped trough and the slot are closed air-tight by the " external pressure of the atmosphere against the internal " vacuum."

" The flexible bar or chain-like arrangement of pieces consists " of a series of metallic or other blocks, having a transverse section " corresponding with the V-shaped section of the trough or " channel, whilst they are bevilled in the direction of the length " of the tube, say, to some angle between the angles of 90° and " 45 degrees, as may be found most convenient, these two bevilled " faces being parallel to each other. Each piece is hinged to the " next adjoining piece either by a link, bar, or equivalent means, " to admit of free motion upward or out of the groove, and they " are attached on their under face to an elastic band or web by " which the resilient and re-sealing action upon the longitudinal

" grove or slot is effected; and, in like manner, there may be a " band or web extending longitudinally along the top of the " hinged pieces which form the continuous flexible valve. Upon " the piston carriage is mounted a curved lifting piece or means " of raising the flexible bar or valve out of the V-shaped grove, " so as to admit the atmospheric pressure behind the piston, at " the same time affording means of connecting the railway " carriage or train with the piston or piston carriage, or of communicating forward motion. By means of rollers attached to " the carriage the pressing down or re-sealing is effected."

[Printed, 8*d*. Drawing.]

A.D. 1863, May 23.—N° 1299.

HOPKINS, John.—(*Provisional protection only.*)—" Improve" ments in points and in crossings used on railways and on tram" ways."

" These improvements consist in attaching to the thin edge of " the point rails a connecting piece of metal which lies between " them, each end of such connecting piece being secured to the " pointed end of the rails by a hinged joint; each of these joints " may be of cast or wrought metal, and each of them forms part " of a second hinged arm or joint, which projects from the point " rail; the joints at the ends of the arms are secured to studs pro" jecting from a plate or plates attached to a sleeper or other " equivalent foundation; the plates and studs lie in the space " between the main rails. At or near the centre of the connecting " piece is a stud or lever which stands up above the top of it; this " stud or lever being actuated on one side will throw one point " rail towards one main rail, and the other point rail off the other " main rail. The movement of the stud and connecting link is " effected by means of a cam made in such form that, when it is " operated upon by the connecting link, as above described, the " point rails will be held in that position until the train, carriage, " or carriages have passed by or through it."

The cam forms part of a rocking shaft, which is capable of being acted upon by a lever on the train.

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 26.—N° 1322.

MUNRO, James, and SCOTT, Robert.—" Improvements in " apparatus for boring, mining, and excavating or cutting, in " motive power engines, and in pressure gauges."

"This invention comprises various improvements relating to " boring and other mining operation, and excavations or cuttings, " and, in part, applicable to steam or other motive power engines, " the object of the improvements being, generally, increased effi- " ciency with simplicity of construction."

The machinery embodies the principle of a tool or picked worked by the direct action of a piston " moving angularly in a segmental chamber." The invention also relates to a winding apparatus, and to excavating by means "of a heavy ram or tool carrier " working in guides in a frame traversing along guide frames or " bearers."

[Printed, 1s. 4d. Drawings.]

A.D. 1863, May 29.—No 1350.

LOEDER, William.—(*A communication from Gabriel Dümler.*) —" Improvements in rails for railways."

"The object of this invention is to economise on the cost of " permanent way by making part of the rail more permanent, and " the head not only more capable of resisting the shocks of the " rolling stock, but easily removeable when, from wear, fracture, " or other cause, it is found desirable to renew the surface or head " of the rail. The rail is, according to this invention, made in " two parts, the body and the head, or in more than two parts, " the body being itself sub-divided for the better securing it on " the sleepers, and the rail head on or into the body. By adopt- " ing this system, the head of the T rail (or head of other shape) " is," "made of steeled iron or steel itself," while the two parts of the rail body and head " can be laminated separately, making the " head with double stem and the body with a ridge, so that, " when the head is received on to the body, a bolt is passed " through the stems of the head and ridge of the body to secure " the two parts together; or this may be in a sense reversed, the rail " head being made with one stem, and the body with the receiv- " ing sides, forming, when in position, plough and tongue, the " tongue being formed with the rail head, and the plough with " the body thereof; a bolt or screw is passed through to secure " the parts in position, as previously mentioned, or the body of " the rail is made in separate (say two) parts, and, when brought " together to receive tongue or stem of the rail head, the cavity " below the stem of the head can be filled with wood or other " material, or the body can be formed with a ledge, on which a " portion of the under part of the rail head rests, while the stem

" or tongue running partly down the body, which is recessed to " receive it, is fastened thereto by a bolt or other fastening, and " the parts can be manufactured to assume various shapes or " forms. Again, where, desirable, two parts can be let into " each other, and then brazed or soldered, but" it is preferred " to use bolts, screws, fish plates, or other rail fastenings well " known and in ordinary use."

[Printed, 10*d*. Drawing.]

A.D. 1863, June 9.—N° 1432.

EDWARDS, John.—(*Provisional protection only.*)—" Improve- " ments in railway chairs and sleepers."

The patentee says: " I take two or more suitable pieces of wood " and bolt or fix them together to get a sleeper of the requisite " size; I make a chair with a tongue-piece to insert between the " pieces of wood. This chair I sometimes make of wrought-iron " and cast-iron combined, the tongue and jaws I make of " wrought-iron and the sides of cast-iron, which are fixed to the " tongue; sometimes I make the sides of wrought-iron and fix " them to the tongue; sometimes I use the wrought iron part " only, by fixing it either in the incision in the sleeper, or fixing " it to the sides of the sleeper. I pass a bolt through the tongue " piece, which holds the chair in its place. I also make suitable " incisions in solid sleepers, into these incisions the tongue piece " on the chair is passed and is bolted to the sleeper. I also make " a chair with a tongue piece; this tongue piece is hollowed in " the centre, so that when the rail is in the chair it bears on the " sleeper instead of on the chair. I also make chairs with the " edge of the bottom turned off to prevent cutting into the " sleepers. I use a split iron key to fasten the rails, putting wood " or some other elastic body between; sometimes I pass a screw " bolt through the side of the chair to fasten the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1863, June 10.—N° 1441.

AITKEN, Russel.—(*Provisional protection only.*)—" Improve- " ments in the permanent way of railways."

" This invention relates more particularly to a peculiar con- " struction and arrangement of combined chair and sleeper, " whereby the rail is held in its place in the chairs without the " aid of the usual wooden wedges." " It is proposed to cast the

" combined chair and sleeper in two parts, which are hinged " together by a hinge-pin running parallel or nearly so to the " rail, each half of the sleeper having a chair jam cast thereon. " The rail rests upon a wooden or other cushion inserted beneath " or at the side of the rail. The proper guage is maintained by " the usual or other wrought-iron tie bars, and jibs, and collars; " which latter serve also to keep the jaws of the chair firmly " against the sides of the rail. The weight of a passing train " tends to steady the rail by producing a powerful gripping action " of the jaws against the sides of the rail. Provision is made for " packing the sleepers from the surface through holes made " therein or otherwise."

[Printed, 4*d*. No Drawings.]

A.D. 1863, June 11.—N° 1454.

VAN TENAC, Charles Louis.—(*A communication from Jean Arthur Granet.*)—" An improvement in railway wooden sleepers." " The principal object of this invention is a flat wrought-iron bar, " which by its peculiar make and the way of fixing it on the " wooden sleepers, makes the line perfectly secure and able to " resist a longer time than with the other wooden sleepers."

The 'bar' is a kind of sole plate fixed on the sleeper upon which the chair or rails are secured.

[Printed, 2*s*. 4*d*. Drawings.]

A.D. 1863, June 27.—N° 1614.

DUNN, Thomas.—" Improvements in the construction and maintenance of the permanent way of railways."

The sleepers are made of " square plates of wrought or cast-" iron with the angles turned down into the ballast; jaws or " chairs are either welded or riveted on to hold the rails, or the " sleepers are made convex and concave, combined with or with-" out timber packings between the chair and the sleeper; these " packings are either triangular, square, semicircular, or cylin-" drical, and some of these packings form the tie bars for keeping " the rails to the proper guage. The under side of the chair " must be formed to correspond with the packings which are " made, so as to be easily removed when crushed or damaged. " The rail is fastened to the chair by an iron wedge or key, which " is afterwards secured by molten lead or other suitable metal.

" When chairs are secured to the ordinary wood sleepers, the bed " plate " is made " either circular or nearly square, in order to con- " centrate the area more directly under the rail, and the chair " is fixed " to the sleeper by one bolt and two trenails, or two bolts " and one trenail; the trenails penetrate to a a certain extent the " ordinary wood keep by which the rails are held in the chairs, " thus keeping them in their place when shrunk or damaged. " The improvements in the construction and maintenance of rail- " ways consist in the use of a combined machine " called " the " 'plate-layers' steam companion;' it comprises a small loco- " motive engine, with a crane and machinery for sawing, drilling, " punching, bending, and pressing the wood and metal required " in constructing and repairing the permanent way."

[Printed, 7*s*. Drawings.]

A.D. 1863, July 10.—N° 1727.

JONES, William Edward.—(*Provisional protection only.*)— " Improvements in the permanent way of railways."

This invention "consists in making metal sleepers with a " spindle or shank, for the purpose of securely fixing the sleeper " to the ground. The spindle or shank is by preference provided " with a broad screw, somewhat in the manner of a screw pile,' " for adjusting the level of the rails. The sleeper is by preference " provided with a circular groove or channel to receive the heads " of screw bolts which secure the chair to the sleeper, and when it " is desired to adjust the level of a rail these screw bolts are " slackened, and the sleeper with the screw shank or spindle is " turned in the required direction until the desired adjustment is " obtained, when the bolts are screwed up and the rail is ready for " for traffic. Sometimes instead of employing a circular groove " or channel a number of bolt holes are provided, so that the " desired adjustment may be obtained by turning the sleeper and " screw shank or spindle to the required extent, and then passing " the bolts through these holes which are then opposite the holes " in the chair, or the chair may be secured to the sleeper by a " central pin or otherwise, in order that the sleeper may be capable " of turning independently of the chair. The spindle or shank may " be made separate from the sleeper and secured thereto by rivet- " ting or other suitable means, or the spindle or shank may be " made to turn independently of the sleeper. When laying rails " according to the invention upon a foundation of wood, the screw

" shank or spindle to the chair or sleeper will be of a smaller size " and somewhat of the character of an ordinary wood screw. The " spindle or shank may however in some cases be formed without " a screw, and would then simply require to be driven into the " ground."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 10.—Nº 1730.

CAMPBELL, James.—(*Provisional protection only.*)—" Improvements in the permanent way of railways, and in supporting the " rails thereof."

The invention " consists in forming the rails with a very deep " web, and in constructing the supporting chairs and sleepers of " wrought and cast-iron combined. The latter part of the invention may be carried out in various ways, but " it is preferred " to " support the rails in a saddle made of cast-iron. The web of the " rail is made deeper than usual, so that it may have plenty of " lateral support, which will prevent it from getting out of guage. " This deep web is inserted into the saddle pieces, which are supported by and rest on dish-shaped longitudinal sleepers. If " desired, the saddle pieces may be divided into two pieces, each " of which will have a hooked piece to support the rail, or the " rails may be supported in wrought iron saddle pieces rolled to " suitable section to take the web of the rail. In this instance " the saddle pieces and longitudinal bearers will be combined in " one piece, and may either be subdivided in lengths of convenient " size, or the combined chair and sleeper may be continued uninterruptedly under the rail throughout its extent. In order to " keep the rails in guage cross tie rods are used, as in other " systems of permanent way."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 10.—Nº 1731.

HAWTHORN, Robert, and **HAWTHORN,** William.—" Improvements in the working of railways."

" This invention relates to a mode of working trains on railways generally, and especially the trains on underground railways " or others by stationary engines; and it is proposed to place " in the intermediate space between the two lines (if a

" double line) a series of double grooved sheaves fixed on spindles " which pass under and across, near to the centre of each line of " rails, each of these spindles having on opposite ends a wheel or " roller. From a stationary engine placed in a convenient part " of the line, an endless wire or other rope passes alternately over " and under the grooved sheaves to the extremity of the line, " where it is taken round a large loop sheave properly fixed, and " returns, then passing over each sheave which it before passed " under, and *vice versa*, the double groove providing for the rope " crossing itself without contact. Having traversed twice along " the line of sheaves, the rope passes again into the large drum of " the engine, on which a sufficient number of turns are taken to " ensure the requisite friction. By this arrangement of the rope " on the sheaves it will be seen that every alternate sheave runs " in the same direction, and this motion is communicated to the " traction wheels or rollers. The traction carriage is made of " such a length that the traction bars with which it is fitted " extend over two or more alternate traction rollers, and it is furnished with the ordinary flanged wheels for running on the " rails. The traction bars of which there are two, are placed side " by side and worked either in connection with or independent of " each other by a suitable arrangement of levers or other gearing, " by which either of the bars can be raised or depressed, thereby " bringing the weight of the carriage upon the traction wheels or " rollers, thus giving motion to the train of carriages in either " direction, or both these bars can be relieved from contact with " the traction wheels or rollers, and the train left free from all " tractive force. One of the traction bars being depressed while " the other is raised, comes in contact with a pair of alternate " traction wheels or pullies running in the same direction, the " carriage and train attached to it being driven along the line in " that direction by the adhesion between the traction bar having " the weight of the carriage upon it, and the rollers with which it " is in contact. If now this bar be raised and the other depressed, " it comes into contact with another alternate set of rollers " running in the opposite direction, and the motion of the " carriage and train is reversed. The motion of the train can be " quickly and certainly retarded or stopped by raising one bar " and depressing the other in the manner of a brake, thereby " reversing the direction of the driving motion."

[Printed, 8*d*. Drawing.]

A.D. 1863, July 11.—N° 1739.

GREAVES, Hugh.—" Improvements in the construction of " railways and tramways."

" The first part of this invention has reference to an improve" ment upon part " of the inventor's " Patent, dated the fifteenth " day of May one thousand eight hundred and fifty-six, ... " and consists in the employment of a metallic bush, in conjunc" tion with the wooden bush there described, for the purpose of " giving increased surface, and thus affording greater security " of attachment between the chair and the sleeper." The bush may be made expansive.

The second part consists of an improvement upon that part of the inventor's " Patent, dated the twenty-eighth day of October " one thousand eight hundred and fifty-nine, which has reference " to an improved method of forming, moulding, and casting " railway chairs and sleepers. The present improvement consists " in so forming the pattern of the chair as that by a division " thereof it shall leave its own cores for the formation of the " trenail holes, and that instead of being cast, as hitherto, with " the bottom side of the chair uppermost," " it is cast with the " jaws uppermost, and the bottom is thereby rendered more likely " to be solid and free from sponginess or other unsoundness in " the metal." It also consists in an improved mode of moulding sleepers.

The third part has reference to an " improvement upon the " form of tramway pipe described " in the Specification of his " Patent, dated the fifth day of March one thousand eight " hundred and fifty-seven, and consists in forming the groove or " recess for the flange of the guiding wheel or wheels of the " carriages travelling thereon at or near the edge of the upper " surface of the pipe instead of at or near the centre thereof."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, July 15.—N° 1777.

TAMET, Dominique.—" Improvements in breakwaters, and in " the construction of rail and other ways thereon."

" The object of this invention is to construct floating break" waters of wood (without masonry to support them) . . . . for " the purpose of establishing small ports or harbours of refuge " at any point of the coast. They may also be used for the pur-

" pose of protecting the mouths of rivers from the effects of
" heavy weather, which renders the entrance or exit from such
" rivers difficult."

"The advantage of this invention is the capability of placing at
" any point this description of breakwater without the necessity
" of submarine work other than securing the chains or the
" placing of the anchors, which are for the purpose of giving
" to these breakwaters, if not a complete immobility, at least a
" sufficient rigidity to resist the waves, and to break them in their
" passage."

"Another object of this invention is the application of this
" arrangement of mole or breakwater to effect the establishment
" of a railway, or other kind of road for vehicles or foot passengers, constructed on the same principal as the moles or break-
" waters themselves for the purpose of uniting two shores or
" banks."

[Printed, 8*d*. Drawing.]

A.D. 1863, July 23.—N° 1846.

MEISEL, Moritz.—(*A communication from Carl Schouberszky.*)
—" An improved apparatus for regulating the speed of trains on
" railways, and in assisting the locomotive engine and train in
" ascending and descending inclined planes."

The invention consists in " the use and application of fly wheels
" for equalizing the speed of railway trains whilst moving on
" inclines, the axis of the fly wheels being put in motion by
" friction wheels."

Secondly, in " the construction of new railroads with steeper
" gradients without diminishing the length of trains, by admitting steeper gradients there will be a great saving in earthwork,
" bridges, viaducts, and tunnels, and the length of roads can be
" shortened, so that the cost of construction would be rendered
" cheaper. This apparatus has also the advantage of modifying
" the velocity of a train in descending gradients and facilitating
" the ascending of inclines."

[Printed, 10*d*. Drawing.]

A.D. 1863, July 27.—N° 1866.

BROOMAN, Richard Archibald.—(*A communication from Charles Marie Pouillet.*)—(*Provisional protection only.*) — " Improvements in sleepers or supports for the rails of railways."

"The sleeper or support is a metal plate or table which is " secured by rivets to a T-shaped bar or rod, this bar should be " sufficiently rigid to resist the strain of a passing train, and to " maintain the perfect gauge of the line." A cross " angle iron " placed under the table is optional; its object is to prevent the " slipping of the sleeper longitudinally. Upon each table is " fixed a support. This support is one of the chief features of " the invention; it is secured to the table by rivets, and may be " more or less raised above the table according as the table " is more or less sunk in the ground. On the upper part of these " supports is fixed a rail by bolts and keys, or a chair for receiv- " ing a double-headed rail. To fix a rail with a broad base, a " stop secures it on one side, and a hook wedged in by a key on " the other."

Another method is " somewhat similar to that now in use for " wooden sleepers. A laminated metal shoe" is used " of about " the length and breadth of an ordinary wooden sleeper, with " a rib underneath and a swelling on its edges. Near each end " of the shoe, supports" are attached " by rivets for receiving " the rail as in the preceding case, the rails are secured by bolts " and keys."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1863, August 6.—N° 1937.

DOWSON, JOSEPH EMERSON.—"A new application of rolled " metal plates to the formation of roadways, bridges, tramways, " and other structures."

"This invention relates to the manufacture and use of rolled " metal plates of a trough-like section, having flat, concave, " convex, or otherwise formed soles or webs, with angular edge " plates or flanges along each side, or with a single flange, for " railway purposes, &c.

"The invention also relates to the application of the aforesaid " metal plates having a rail head formed thereon or fitted thereto " to the permanent way of railways or tramways, or as railway " transverse or longitudinal sleepers. The ends of any of the " plates may be secured together by a lap joint, by a fishing plate, " plain or ribbed, by angle iron, or by the formation of flanges " on their ends, and by bolting, rivetting, or otherwise."

[Printed, 10*d*. Drawings.]

A.D. 1863, August 8.—N° 1966.

ARMSTRONG, John Ward. — " Improvements in fastening " and in securing in position the rails of railways, the said fastening being applicable for other uses."

The patentee says, " For fastening the ends of rails together to " form a line of rails, or for joining other things where the same " kind of arrangements can be usefully applied, I use washer " fangs, ... such fangs being provided with recessed or dressed " portions for the reception of the nuts on the end of the bolts " which pass through the bracket or half-chair part of the fish-" plates used for joining the ends of the rails. The nuts cor-" respond to, and fit in, the recessed or depressed portions, " enabling the screw bolt to work through without causing the " nut to turn round. . . . . For securing the rails in position, " I adopt and apply chairs, in which the rail is supported by the " jaw of the chair, against which it is firmly upheld and kept in " position by" " a wooden key being driven in. In laying these " chairs so as to well secure the rails in position, one holding " jaw of the chair is placed on the right hand side of the rail, " and the next holding jaw on the left hand side of the rail, and " so on to the whole extent of the line of rails, which arrange-" ment produces practically the same effect as if the rail were " caught on each side at the same place, the necessity for through " bolting being thus avoided, whilst the wooden key being easily " removable, affording greater facility for repairs, and the lower " table of the rail being kept free from contact is not liable to " wear. The wooden key can be made to taper off well. The " bolts may have a running nut at each end, or a fixed head at " one end and a running nut at the other end. The various " parts may be galvanized, and made so as to act well together."

"In using my improved washer-fangs to join rails together, " I should use a bracket, a sort of half-chair arrangement, to " which the rail is secured at the fish-plate joints, the base of this " half-chair being bolted through and secured by the washer " fangs."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1863, September 8.—N° 2211.

JACK, James Deas.—" Improvements in moulding or shaping " metals."

"The invention relates to the application, employment, and use " of mechanical means and apparatus for effecting the ramming " of the sand in making metal castings in place of using manual " labour as heretofore."

"The machine is used for moulding the chairs for supporting " railway bars, but it is also equally applicable for moulding of " other forms and construction of articles."

[Printed, 10*d*. Drawing.]

A.D. 1863, September 17.—N° 2230.

EDWARDS, John, and LIVESEY, James.—(*Provisional protection not allowed.*)—" Improvements in the permanent way of " railways."

The invention " consists in putting suitable springs to carry " the rails to break the concussion, a suitable chair or sleeper " is formed, " the springs being made to bear on the chair or sleeper " supporting the rail; also in forming suitable metal spring keys, " or metal and wood combined, to key up the rails instead of the " ordinary wood keys as now employed; a recess is made in the " metal key to prevent it shaking out; also a metal fastening " piece is employed in the combined metal, and wood keys; also " in making a hollow metal spike " " of unwelding tubing or " split in the manufacture, the inside is made slightly irregular " with the bottom part turned in. When the spike is driven " home, a solid pointed spike is driven into the hollow one, " forcing or expanding the sides, and especially the bottom part, " so as to secure it firmly in the timber; also in forming a chair " with a suitable metal filling piece, between this metal filling " piece and the chair a spring is driven in, which tightens the " rail, sometimes between this metal filling piece and the chair " a wood filling piece " is inserted, " and then a metal plug " is driven in " to tighten the rail; this wood filling piece " is sometimes cased " with metal; in this chair, for joints, two or more " points or projections " are formed, " which enter the holes in " the ends of the rails, and thus the rail is prevented from drawing out of the chair."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 21.—N° 2320.

ELSDON, William.—" An invention for the construction of " rail and road carriages and improved wheel tyres, and an

" improvement in railway crossings, adapting them to such " carriages."

The patentee claims—

First, " the general form of a tire having a double running " surface adapted for wheels intended to be used either for railway or road purposes, and in which the side of that portion of " the tire intended to be used for running on streets or roads will " act when the wheel is on the rail as a flange to the portion " intended to be used for running on the rail."

Secondly, " the adaptation of means of locking and unlocking " the frame of the forewheels to carriages intended for travelling " both on railways and on streets or roads."

Thirdly, the use of an " additional guard or check and wing " rails, and an additional tongue, and the sloping of the ends or " end of the same, and the adaptation of railway crossings, by " means of these assistants to wheels of carriages when fitted " with such tires or hoops as before described, having on the " inside of the tire the portion intended for running on roads, " so as to allow such wheels to run over the crossings on railways, while, at the same time, permitting engines, carriages," and trucks, " and other vehicles commonly used on railways, to " run over such crossings in the usual way without interruption."

[Printed, 10*d*. Drawing.]

A.D. 1863, September 21.—N° 2332.

VON KANIG, WILHELM ADOLF. — (*Provisional protection only.*)—" Improvements in railway telegraphs and signals, and " also in the permanent way and carriages for preventing railway " accidents."

"This invention consists, first, of a self-acting telegraph and " signals, by which the relative positions and progress of the " trains are indicated and regulated; secondly, of a train, tele" graph, and signals by which a means of communication is pro" vided between all the carriages and the guards and engine" drivers; thirdly, of a guard rail and guide wheel by which the " trains are prevented from running off the line; and fourthly, " of a train guard or fender for removing impediments in front of " the trains."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 29.—N° 2390.

GEDGE, William Edward.—(*A communication from Narcisse Antonin Brocot and Aimé Labarre.*)—(*Provisional protection only.*) —" Improvements in parts of the permanent way of railways."

" The object of this invention is to more completely secure the " jointings of the rails " " of a railway, no matter what fish-plate " or chair be used."

" It is proposed to substitute in lieu of the two bolts nearest " the but ends of the rails an iron key with iron cottar or wedge. " This new method will give a rigidity to the joint which will not " be liable to become relaxed, the two rails will be more bound in " one than if tied by four bolts as usual, and if a rupture should " take place near the joint, the key would offer a resistance " against dislocation much greater than would the two intermediate " bolts to be dispensed with; further, to keep the two end " bolts from unscrewing, it is proposed to secure them by means " of a metal plate fitting on to the key, and with its two ends cut " so as to embrace two or more sides of the nuts of the two end " bolts. This plate being passed over the end of the key until it " lies with its two ends against the nuts of the bolts, a cottar or " wedge is passed through the key on one side the rail, and a " light and rigid joint is secured. It is proposed to divide the " end of the cottar or wedge, so that when it is passed through " the hole in the key, the two branches thus formed may be " spread apart by any suitable tool, and the cottar be thus prevented from shaking out under any vibration."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 7.—N° 2461.

JOHNSON, John Henry.—(*A communication from Miguel de Bergue.*)—(*Provisional protection only.*)—" Improvements in the " permanent way of railways."

This invention " consists in the employment of wrought or cast " iron transverse sleepers which are rolled or cast of a hollow " or trough shape on the under side. . . . . Or an undulated " section might be used so as to present three supporting points, " the main bearing being in the centre line of the sleeper. Some " of these sleepers are made to extend across the way so as to " carry both the rails, and between them other intermediate

" sleepers of the same form, but shorter, are employed. The desired cant or inclination of the rail is obtained in a certain " and exact manner by bending downwards the longer sleepers, " more or less, in the centre, according to the degree of cant " required. In securing the flat-bottomed rail to these several " sleepers, the tops or rail bearing surfaces of which are made flat, " it is proposed to employ wrought or cast-iron clips placed on " each side of the lower flange of the rail, the clips being curved " in such a manner as to rest at one end upon the top of the " sleeper, and at the other upon the flange or foot of the rail. " The clips are tightened down upon the rail flange by means " of screw bolts passing up through the sleeper and through the " clips, and secured by a nut or key, or by rivetting them over " the clips."

Double-headed rails may also be secured to these sleepers.

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 12.—N° 2503.

AITKEN, RUSSEL.—" Improvements in the permanent way of " railways."

" According to this invention the sleeper chair, which in general " outline may resemble the sleeper chair commonly known as " 'Greaves' pot-sleeper,' is cast in two parts, each part having a " chair jaw cast thereon, and provided with lugs on the inner " under surface, with a keyway or hole running through them, " parallel with and beneath the rail. The two halves of the chair " are tightened up against the opposite sides of the rail, and the " opposite halves of the sleeper are held together by driving a " key or keys into the keyway made in the lugs on each half of " the sleeper. In order to obtain a certain amount of elasticity " in the permanent way the key or keys may be made of steel, " and the lugs rounded slightly at those parts against which the " key or keys bear. The guage is maintained by tie rods, the " ends of which are inserted into sockets cast for that purpose " upon the sleeper chair, and the same key or keys which secure " the two halves of the sleeper chair together also pass through " a slot near the end of the tie rod and thus hold the chairs at " the proper guage."

[Printed, 10*d*. Drawing.]

A.D. 1863, October 15.—N° 2525.

LESLEY, Peter.—(*A communication from Thomas Shöenberger Blair.*)—" Improvements in the manufacture of rails for rail-" ways."

"The nature of this invention consists in combining the car-" bonization of a part of a railway bar with the subsequent re-" rolling of the whole rail while still hot, or after being re-heated.

" In carrying out the invention, railway bars, either in the " finished condition in which they are commonly laid down, or " else in a condition not entirely finished, but requiring one or " more passages through the finishing rolls, are packed in the " 'pots' of a converting furnace of ordinary construction for pro-" ducing blister steel, where they receive carbonization by the " well-known process. The packing with which the rails are sur-" rounded may consist entirely of carbonaceous materials, or only " so much of it as surrounds the heads of the rails, whilst the " rest of the surfaces of the rails are placed in contact with clay, " sand, or other isolated non-carbonaceous material. The pots " being filled with successive layers of rails and sealed up, heat " is then applied as practised in the usual manufacture of blister " steel, until the trial bars indicate that the desired degree of car-" bonization has been attained. The fire may be then extin-" guished and the furnace and its contents allowed to cool, and " the rails afterwards removed in readiness for the next step of " the process. But " it is preferred " to make the breasts of the " pots removable at pleasure in sections, so that the rails may be " withdrawn one by one while still at a sufficiently high heat, and " immediately taken to and passed through the rolls until the " blisters are reduced and removed, the surface rendered smooth, " and the texture of the carbonized portion of the rail changed " from that characterising blister steel to that characterising " spring steel, that is condensed and toughened, after which the " rails are straightened in the usual way and used."

[Printed, 6*d.* Drawing.]

A.D. 1863, October 17.—N° 2548.

WRIGHT, John.—(*Provisional protection only.*)—" Improve-" ments in machinery for cutting railway sleepers to receive rail-" way chairs."

"The sleeper is fixed on a suitable bed or plate, which is " arranged to slide or move on suitable rails or guides. Two

" pairs of circular saws are employed, one pair near each end of a " sleeper, by which two pairs of parallel saw cuts are simultaneously made in the sleeper. The wood between these saw cuts " is next removed by two rotating adzes or cutters, one acting " near each end of the sleeper. The recesses which are to receive " the railway chairs are then completed by centre bits or rotating " cutters acting simultaneously near the two ends of the sleeper; " or, if the railway chair be suitably shaped, the whole of the " recesses in the sleeper might be cut by means of revolving " circular cutters."

[Printed, 4*d.* No Drawings.]

A.D. 1863, October 19.—N° 2556.

WHITLEY, JOSEPH.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

"These improvements consist of a sleeper made of cast malleable iron, wrought iron, or steel, with or without flanges on the " sides and ends, and with one or more ribs on the back, and with " or without indentations on the upper surface to receive the " chairs; the same to be cast, rolled, or struck in dies or blocks, " as most convenient."

[Printed, 4*d.* No Drawings.]

A.D. 1863, October 24.—N° 2635.

ALISON, ALEXANDER.—(*Provisional protection only.*)—" Improvements in atmospheric railways and in carriages for the " same."

"The invention consists in the use of an improved flexible " valve in the air tube of ordinary atmospheric railways, in the " novel construction of an atmospheric tunnel railway, and in " carriages, the latter being also applicable to ordinary railways " and tramways."

"The valve employed is constructed of gutta percha or other " flexible material, and is so formed that is raised up by the piston " rod and returns immediately after the passage of the same. " The piston rod being constructed flat, will not open the valve " more than one-and-a-half inches, and as the pressure of the " atmosphere will keep the valve tight, very little external air " will enter the tube."

"The tunnel employed (when the tube is dispensed with) is " constructed of any suitable material, and convenient size, for

" the passage of the train. Attached to the front of the first carriage of the train is a curtain or piston nearly filling a section of " the tunnel. This curtain or piston is constructed of metal or " wood, and moves on wheels with a guiding wheel running on " a rail at the top of the tunnel. Though attached to the carriage, " the piston is freed from the oscillation of the carriage to which " it is attached. To avoid any change, a piston may be attached " to the last carriage. One or more doors are placed in each " piston. By the opening of those in the front piston the " vacuum will be at once destroyed, and by keeping those in the " rear piston open, the passenger carriages of the train will be " continually supplied with fresh air. In addition to the ordinary " breaks, is used an accumulating power break, similar in form to " the main spring of a watch . . . . . A stationary engine working large fans is placed at each end of the line and at such " intermediate points as may be found desirable."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 27.—N° 2658.

CARR, MARK WILLIAM.—(*Provisional protection only.*)—" Improvements in the manufacture of wooden sleepers for rail-" ways."

" The sleeper is made with grooves across its upper surface of " such form and dimensions that the particular rails and keys to " be used may be securely and conveniently held in the grooves " very much as the rail and key are held in the jaws of the ordinary cast-iron chair." "The grooves are more or less dove-" tailed in their transverse vertical section, being wider below than " above. They are also of sufficient width to admit of the key or " keys being driven tight between the rail and one side of the " groove. . . . The invention thus consists in attaching the " rails of railways to the transverse sleepers of wood by means " of grooves and keys without any assistance from chairs, " spikes, nails, 'dogs,' screws, trenails, straps, or other like " contrivances."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 2.—N° 2710.

VANDENVINNE, FLORENT JOSEPH.—" Improvements in machinery for excavating land, making cuttings, and other earth " works."

"The machinery is intended to make cuttings in mountains " and hills for railways, roads, canals, or other works. For this " purpose a framework mounted on wheels and running on rails " or on a tramway is employed, this carries a small steam engine " of sufficient horse-power to work the apparatus. On the front " part of the frame are placed two vertical shafts in wrought iron, " working in bearings bolted to the frame, these shafts are furnished with a number of arms carrying picks with steel points, " they are fitted and wedged to the shafts, and the picks are placed " on the shaft so as to form the blades of the helix or screw, so " that only the points of one set of picks of each shaft touch at " the same time the earth to be removed, and the sets of picks " succeed each other without interruption. These shafts work in " opposite directions, so that the picks cross one another continuously, and the arms on the upper ends of the shafts are " longer than at the lower ends so that they make in working " a sloping cutting. The shafts with the picks are actuated by " gearing and driving belts from the engine. This apparatus " cuts and detaches the earth and throws it into buckets fixed on " an endless chain; the buckets take the earth up to the top of " the frame and empty it down an inclined plane into waggons " for removal; . . . . the frame is worked forward by a shaft " fitted with a screw working with a worm-wheel on the axles of " the carrying wheels, the whole apparatus is thus moved forward " so as to keep the picks continually in contact with the earth."

[Printed, 10*d*. Drawings.]

A.D. 1863, November 4.—N° 2722.

LIVESEY, JAMES, and EDWARDS, JOHN.—"Improvements " in the permanent way of railways and fastenings for the " same."

The invention "consists of a railway chair or sleeper of either " wrought or cast-iron plates, made at a suitable angle to fix to " the rails and fastened by bolts or other convenient fastenings. " A slot is made in the chair or sleeper, through which passes the " tie-bar to keep the road to guage, and in order to give strength " to the plates, a cotter is driven in, passing through the tie-bar, " and resting or binding on the plates; these chairs or sleepers can " form a combination of chair sleeper and fish plates; for the " latter, the plates are bolted with either four bolts in the usual

" manner, or with three bolts; the centre bolt being made round, " square, or any other convenient form, passing immediately " through the joint of the rail, each end of the rail being slotted " or punched with a half round hole, so that when in position the " two slots or punches form a hole to receive the centre bolt;" this plan is adapted to any other form of fish joint. "Also in a " chair or sleeper of cast iron, between the rail and jaw of the chair " or sleeper, a filling piece is inserted, so arranged that a spring " or other fastening can be driven in to secure the rail. Also in " making a hollow spike of iron or other suitable material to fasten " the chairs to sleepers; this spike is made hollow, with the internal " diameter diminishing towards the bottom, and is split in halves " about two-thirds of its length; when this spike is driven home " a parallel spike is driven into the hollow one, forcing or expanding the sides and dovetailing it into the sleeper; this hollow " spike may be made in two halves, if preferred. Also in making " a wooden key with a metal strap fixed on one side, which is " turned up after the key is driven in, and is thus prevented from " shaking out of its place; these wooden keys we sometimes case " with metal, to prevent decay or injury by insects."

[Printed, 1*s*. Drawing.]

A.D. 1863, November 5.—N° 2744.

BESSEMER, Henry.—" Improvements in the manufacture of " railway bars."

This invention "has for its object the utilization of the materials " of which such old or worn wrought-iron rails are composed by " employing them in combination with pig or other carburet of " iron, and thus remanufacturing the old rails in such a manner " as to produce cast steel rails from the combination of wrought " and pig iron so manufactured. For this purpose" the inventor prefers "to use the converting apparatus generally employed in " the manufacture of cast steel by what is known as the Bessemer " process. The second mode consists in giving a more perfect " wearing surface on those rails that are manufactured by welding " one or more steel slabs on to a pile of old rails or other puddled " iron."

These slabs are to be cast in open shallow moulds.

[Printed, 6*d*. No Drawings.]

A.D. 1863, November 13.—N° 2830.

REMINGTON, GEORGE.—(*Provisional protection only.*)—"Im-"provements in atmospheric or pneumatic railways and loco-"motive engines to be used in connection therewith."

The patentee says:—"I propose to use stationary steam or "or other power engines, placed at given intervals along the line "of railway, and to have a tube or main, ... with a con-"tinuous vent or slit covered in the ordinary manner or other-"wise."

This main is to convey air under pressure to a pneumatic locomotive engine, the valve box of which is always to be in connection with the main.

"I further propose, in some cases, instead of having a con-"tinuous slit along the main covered by plates, and leather "hinges, or bands, to have vents or valves at intervals, which "vents may be kept covered by valves to be raised and closed as "the locomotive engine passes over them, and the engine also "carries a slide box, two of the vents along the main being always "kept open to it and to the air chest of the locomotive engine. "In some cases I would employ disc valves to cover the vents or "openings along the main, in other cases slide valves, and in "other cases valves like the keys of a flute."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 18.—N° 2881.

PRATCHITT, WILLIAM, **BLAYLOCK**, JOHN, and **PRATCHITT**, JOHN.—"Improvements in and applicable to moveable "platforms for railway stations."

"This invention relates to an improved construction of move-"able platforms for railway stations, and to the arrangement of "machinery for raising and lowering the moveable part of the "platform where cross roads for the passage of carriages or "traversers are required to intersect the platforms." The "plat-"form consists of a covered girder bridge, resting at the ends "upon moveable supports, and having upon the top rails similar "in gauge to those on the cross road; under this bridge or plat-"form" are placed "one or more hydraulic cylinders, connected "either to pumps or to the service pipe of towns water when "there is sufficient pressure, so that upon withdrawing the "moveable supports, and allowing the water to escape from the

" cylinder or cylinders, the bridge or platform may be lowered to " the level of the permanent way or traverser road, and allow the " passage of carriages or waggons over it, and when the water " is readmitted to the cylinders, the moveable part of the platform " may be raised to the same level as the fixed part."

[Printed, 8d. Drawing.]

A.D. 1863, November 19.—N° 2908.

SYMONS, William.—" Improvements in the construction and " working of railways."

The invention " relates to an improved construction of railway, " and novel mode of propelling the carriages or trains thereon, " which mode of propelling is also applicable to existing railways." According to one part of the invention, it is proposed " to carry railways through streets and other places where an " embankment will be objectionable upon and in open tubular or " latticed viaducts supported on suitable pillars, one line of rail " being in the tube or viaduct, and the other on the top of the " same; or if wheels be substituted for rails on one or both sides, " wheels will be suitably placed in and on the tube," and fixed " at proper intervals between the rails at a sufficient height to " come into contact with a bar attached to the under side of the " carriages. Motion is to be given to these wheels by having an " hydraulic engine connected with each or some of these sets of " wheels. The water power will be conveyed by one or more main " pipes placed along the side of the rails, and connected with each " hydraulic engine by smaller branch pipes, suitable valves " worked by levers being so arranged that the carriages in their " progress will turn on and off the water of the engines as required, " or these valves may be worked by the trains through the agency " of electricity or hydraulic power. . . . . . Instead of having a " bar or rail attached to the underside of the carriages with the " ordinary running wheels on each side, the carriages may be " constructed with wheels to run in a fixed rail on the one side " and a bar as a substitute for wheels on the other side to run on " the fixed wheels rotated by the hydraulic engines; or the carriages may be made without wheels, and rest on two such bars " with suitable flanges moving on sets of two fixed wheels, in " which case fixed rails will be dispensed with."

[Printed, 10d. Drawing.]

A.D. 1863, December 2.—N° 3038.

CAMMELL, Charles, and CROMPTON, Willoughby.—" Improved railway crossings adapted to the ordinary single or " double-headed rails."

"The chief feature of novelty in these improved railway cross" ings consists in forming or casting the three ordinary bearing " chairs in one piece, so as to give continuous support through" out for the entire length of the block or piece, to both the wing " and point rails, thereby ensuring an exceedingly strong, simple, " and durable crossing. By this arrangement or construction of " support for the points or crossings no bolt or fastening will be " required beyond the usual wooden keys to hold down the rails " or secure the chairs. The forms of rails used are of the ordi" nary kind, as are also the forms of the chairs to suit them. " The invention may be carried out in various ways, and the " mode of fitting or securing the rails in the chairs may to some " extent be left to the discretion of the engineer of the line, pro" vided the essential feature of the invention be retained." The patentee " would also observe that either iron or steel rails, or iron " rails with steel points may be used."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1863, December 11.—N° 3122.

SEATON, Charles.—(*Provisional protection only.*)—" Improve" ments in the permanent way of railways."

This invention " consists in constructing longitudinal wrought " or cast-iron sleepers of a rectangular, semicircular, or other " convenient section, laid with their apices or convex surfaces " upwards, and having their corresponding concave surfaces " bedded in the ballast. The rails are of course made so as to fit " the surface or ridge of the sleeper, whether such surface be " rectangular, semicircular, or curved; and, if desired, a cushion " of timber or other suitable material may be placed between the " rail and the sleeper to deaden the noise and prevent jarring. " Other timber blocks are placed inside the sleeper, through " which the bolts employed for securing the rail to the sleeper are " passed. It is also proposed to make a longitudinal groove or " channel along the top surface of these sleepers, and to insert a " piece or pieces of timber therein of such a section as to fit the " groove or channel in the top of the sleeper, the rail resting

" upon the timber. According to another modification the lower
" part of the rail is inserted into the interior of the sleeper, leaving
" the head only projecting above the surface of the sleeper, suitable
" blocks or bolts being employed for tightening and securing
" the rail in its place."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 11.—N° 3135.

PRATT, WILLIAM THOMAS CASSEL.—(*Provisional protection only.*)—" A new method of and apparatus for enabling the points " on railways to be shifted by an attendant in the train while the " train is in motion."

The invention " consists of an iron plate or bar fixed in a frame " at the centre rising above the surface, gradually sloping off at " the ends, having a weight attached to one end resting on a " block to prevent jar in the rise and fall. This plate or bar is " attached by a crank to an iron rod; the other end of the iron " rod acts by means of another crank upon a shifting rail, between " which and the main rail is a groove to receive stones and other " obstructions which might otherwise impede the motion or prevent " its action. Connected with the engine, trucks, and carriages " is a small wheel or wheels under the control of the " engine driver or guard by means of a handle. When it is " required to move the train to a siding or to another line, the " guard, if the train is being backed, or the engine driver if it " be going forward, by moving the handle attached to the small " wheel or wheels will cause pressure to be made on the iron " plate or bar, which, by means of the rod, opens the shifting " rail. After the train has passed the rail will return to its former " position."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 16.—N° 3182.

FELL, JOHN BARRACLOUGH. — " Improvements in railway " engines, carriages, and permanent way for steep inclines."

This invention refers principally to the inventor's previous patent, No. 227 of A.D. 1863, and " consists in the use of " wrought-iron centre or traction rails, fixed on wrought-iron " chairs, and in the use of a wrought-iron rail with flanges in " combination with horizontal traction wheels without flanges.

It further relates to modes of compressing the traction wheels on the rails, of driving the traction wheels, of sanding the rails and removing ice from them, and also to a plan of substituting guide blocks for the flanges of the traction wheels.

[Printed, 2*s*. Drawings.]

A.D. 1863, December 18.—N° 3191.

ALISON, ALEXANDER, and HALLIWELL, JAMES.—(*Provisional protection only.*) — "Improvements in atmospheric rail-" "ways."

"These improvements relate chiefly to the novel construction " and arrangement of the valve on the air tube, and mode of " operating the same; to the use of a double piston, and to the " means employed for stopping the train at the stations, or any " other points on the line. The valve extending the whole " length of the tube is composed of short, bent, or trough-shaped " plates or links, and for this reason is designated a 'chain " 'valve.' These plates may be secured together by means of a " band or sole of leather, or other suitable material, which " band will effectually prevent the passage of air from or into " the tube. The ends of the plates which form socket or hinged " joints may be fastened together by means of pins if found desir-" able. The plates or links forming the valve are constructed " with the longitudinal trough-shaped openings upon their upper " surface."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 24.—N° 3267.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Charles Ferdinand Zorès.*)—" Improvements in the permanent way " of railways."

"This invention consists in constructing iron railway sleepers " of any or all of the forms represented in section in the accom-" panying drawings; these sleepers may be laid either in the " position shown or inverted, and before or after laying them " it is preferred " to ram ballast into the hollow parts, and fix a plate " on each end of the sleeper to prevent the ballast working " out. The manner of securing the rails to these sleepers will " vary according to the form of rail employed; where chairs are " required, they must be of such shape as will correspond to the " shape of the sleeper to which they are fixed."

The drawings show a great many patterns of sleepers with their attachments.

[Printed, 2s. 4d. Drawings.]

A.D. 1863, December 28.—N° 3276.

BILLUPS, JONATHAN EDWIN. — (*Provisional protection only.*) —" Improvements in the permanent way of railways."

"The keys are so formed as to effect the combined purposes of " suspending the rail free from contact with the chair, and effec- " tually preventing the tilting up of one end of the rail when the " load is bearing on the opposite end; . . . . the tilting up of " the opposite end of the rail is prevented by lugs cast on the " chair; the suspending and holding down keys " may also be " hollow and made of wrought iron and other metal, and split " longitudinally. This key can be applied to any arrangement " of chair." Wooden keys and metal hollow keys " may be used " in conjunction with each other. A cushion of wood, india- " rubber, or other suitable material may be fixed in a recess at " the bottom of the chair; one of the keys in each chair may " be so fixed as to prevent its having any longitudinal motion, " the other key being driven in the ordinary manner. That part " of the chair upon which the latter key acts is made sufficiently " convex to admit of the key being driven home, and prevent its " working out." The chair may be made in two parts and joined. "The fixed key may" "be placed alternately on the " outer and inner sides of the rails, so as to ensure the rail " always being held in position should the driven keys work out; " or the keys may be both fixed in recesses in the chair, thereby " preventing their coming out; but in either case it would effec- " tually suspend the rail, and prevent the tilting up of the same. " The chairs may be made of rolled wrought iron, cast iron, or " cast malleable iron. These improvements may all be applied " to a chair and sleeper combined, whether made of cast or " wrought iron, or in one or more parts."

[Printed, 8d. Drawing.]

A.D. 1863, December 30.—N° 3299.

HOUDAYER, MAXIME CHARLES EDOUARD, and CORMIER, JULES JEAN.—(*Provisional protection only.*) — " An improved " apparatus to be attached to locomotive engines for the purpose " of removing obstructions from railways."

"The apparatus consists of two strong cheeks of sheet iron, or
" other suitable resisting material connected together on a suit-
" able iron frame fixed to the beams and the buffer or cross bar
" of the engine; the said cheeks form a sort of protruding
" wedge, the angle of which is situated in the prolongation of
" the axis of the engine, the faces of the wedge forming either
" straight or suitably curved inclines both in the vertical and
" horizontal direction, whilst the two free ends of the wedge
" extend sufficiently far beyond the rails, the lower edge of both
" cheeks nearly reaching these latter, which lower edge is bent
" up into the horizontal direction so as to act in the manner
" of a shovel for lifting any obstacles existing on the track in
" front of the engine, and throwing them aside. The free end of
" each cheek may be prolonged parallel to the outside of the
" locomotive."

[Printed, 4*d*. No Drawings.]

1864.

A.D. 1864, January 6.—N° 35.

MALINS, William.—(*Provisional protection only.*)—" Working " atmospheric railways."

This invention consists, firstly, " in employing vacuum power " obtained by the direct condensation of steam within fixed " cylindrical chambers or other formed vessels suitably disposed " for exhausting the traction tube and producing thereby the " requisite propelling power or atmospheric pressure; " secondly, the use of this vacuum " in connection with fixed or stationary " engines of ordinary construction for giving motion to carriages " or trains " by means of endless ropes or chains, " employing " also in connection therewith an exhaust or vacuum pipe com- " municating from station to station," such tube being provided with a " lifting longitudinal valve and propellor piston travelling " in conjunction with the framing of the carriage or train."

[Printed, 4*d*. No Drawings.]

A.D. 1864, January 7.—N° 48.

RAMSBOTTOM, John.—" Manufacture of hoops, rails, &c. " of cast steel." The first part of this invention relates to the treatment of the ingot of metal.

The inventor describes his method of manufacturing tires as follows:—" I cast ingots of steel of a cylindrical or other form " approaching thereto, of sufficient weight and depth to produce " any convenient number of tires; the ingot is divided into discs " by means of a large circular saw or band saw, or otherwise.

" Each disc is of the requisite depth and weight to produce a " tire, and should first be hammered circumferentially and on " the flat sides to condense the metal; a recess is then punched " into the centre on each side of the disc by means of blunt " punches, and the small portion of steel left between the recesses " is afterwards punched out, thus converting the solid disc into " a thick hoop. If the centre portion of the ingot is found in " cutting, to be defective, the discs must be cut off an additional " thickness to compensate for the removal of the central de- " fective part by a hollow punch. In order to expand this hoop " to the requisite diameter, a conical mandril is inserted into the " hole; this mandril is forced into the hoop by a steam hammer " or otherwise, and at the same time the exterior of the hoop is " struck by the ordinary or duplex hammer. After this operation " has been continued for a certain time, the hoop is taken off the " mandrill, and reduced in thickness by hammering on the flat " surfaces; these operations are repeated as often as is found " requisite, or the hoop may be expanded and reduced in thick- " ness by placing it in on a mandrill, and submitting it to the " action of squeezers acting upon the face and the edge. The " hoop, when sufficiently extended, is taken to the rolling mill, " by which is completed in the usual manner."

Rails are also made out of an ingot by cutting it into the desired number of parts by saws or otherwise.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1864, January 11.—N° 68.

BARLOW, WILLIAM HENRY.—(*Provisional protection only.*)— " Pontoons." This invention consists in constructing pontoons for conveying trains across rivers " in such manner as to be " capable of varying the depth at which the pontoon floats in the " water, so that the deck or upper surface can be always brought " to the level of the wharves at which such pontoon would " receive or discharge its load." This is effected by building the " pontoons in compartments, into which the water is admitted when it is desired to lower the pontoon. The water is expelled by pumping in air. When the pontoon is floated alongside the

wharf, it is lowered "until its bottom rests on surfaces provided
" to receive it, and is so adjusted in position that rails laid upon
" its deck are made to coincide with rails upon the wharf, and
" when the pontoon is so placed, the rails upon its deck form
" practically part of the railways upon the wharf."

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 5.—N° 310.

LILLIE Sir John Scott.—Atmospheric propulsion. The inventor says,—"These improvements consist in the construction
" of tunnels or covered ways of a triangular form; on the base of
" this triangle I propose propelling goods and passengers, by
" means of pistons of the same form attached to carriages or
" trains, and by atmospheric pressure on one side of such
" pistons, and by the removal of the air on the other by any
" means heretofore in use for that purpose. In order that the
" upper portions of passenger trains may move in the open
" air, I propose having the upper sides of this triangle so constructed as to admit of being opened at the apex by means of
" horizontal wheels attached to the sides of such carriages. I
" effect this by making the sides of the tunnel separate, so that
" these upper sides of such tunnel, after being opened, will fall
" into their original position, and the tunnel will resume its
" triangular form, the portion of this tunnel or curved way
" through which the piston passes remaining always closed."
Various modifications are also described, such as, for instance, a rectangular tunnel with the carriage running on the exterior of it."

[Printed, 8*d*. Drawing.]

A.D. 1864, February 9.—N° 343.

WEBB, Francis William.—"Manufacture of railway rails." In order to make a steel-capped double-headed rail the inventor arranges his piles as follows:—He uses old double-headed rails, and his pile is "two rails in width and three layers high." The heads of the rails are together, and those in one layer come into the hollows of those in the adjacent layer or layers. One of the rails in the centre layer is divided in half longitudinally and "one half is placed on each side of the other rail in the
" layer." "At the top and bottom of the pile a tolerably level

" surface is produced by laying puddle bars into the hollows " or spaces, ... and the pile is completed with top and bottom " slabs of Bessemer, or other cast steel. These cast steel slabs" are rolled with ridges at intervals on their inner surfaces to " project and overlap the heads of the rails in the layer above " or below the slab." The weld is thus improved. To make a single-headed rail one of the steel slabs is omitted and another layer of rails added. Old rails are also to be made good, either by re-rolling to a smaller gauge, or by re-heating, upsetting, and rolling to the original size.

In order to put a steel top to an old rail, the inventor lays " a strip of steel serrated or roughed on the under side on the " head of the rails, the two are then put together into a furnace " and heated to a welding heat, they are then pressed through " rolls, first edgeways to make a sound weld, and then sideways " to finish the rail."

[Printed, 10*d*. Drawing.]

A.D. 1864, February 10.—N° 352. (* *)

MIDDLETON, SAMUEL.—(*Provisional protection only.*)—" Improved methods of deadening the noise produced by engines " and carriages in passing along railway bridges and viaducts."

The inventor says :—" The first part of my invention consists " in fitting what I term an absorbent or deadening mattrass to " the under side of bridges and arches. About one foot, more or " less, under the bridge or crown of the arch I place upon proper " supports one or more thicknesses of felt, kamptulicon, or cloth, " or I employ a metal or wood floor, and fill up the space between " it and the under side of the bridge or top of the arch with tan, " sawdust, or other like sound absorbing material."

" My invention also consists in cutting slots, say about a foot, " more or less, long in the rails which are to be used on bridges " and viaducts, and in filling the slots with vulcanized caoutchouc, " gutta percha, lead, or other soft metal. I cause the top of the " filling to spread out at each side, and I also place vulcanized " india-rubber, gutta percha, or other like material upon the " sleepers and under the chairs. I prefer that these filled rails " shall be laid on the bridges and arches, so that the filling in one " rail shall, as it were, break bond with the filling in the other " rail of the pair."

"My invention also consists in the employment on railway " bridges and viaducts of troughs at the sides of and rising above " the rails filled with water or other liquid, in order that the " wheels may run in water."

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 12.—N° 369.

HENDERSON, JAMES, CHILD, SYDNEY CLULOW, and DUNCAN, WILLIAM LUNDI.—"Improvements in rails for railways " and tramways, and the mode of connecting the same."

This invention consists in making rails with dovetails at their ends, joining one into the other, and by this means doing away with fishplates and bolts.

[Printed, 8*d*. Drawing.]

A.D. 1864, February 16.—N° 398.

CLARK, WILLIAM.—(*A communication from Charles Jules Pierre Desnos Gardissal.*)—"Improvements in the permanent way of " railways." The patentee claims,—

First, sleepers formed of rolled iron, "the top of which serves " as a bearing surface for fixing the rail or chair, while its depth " and the form of the sides secure at once both elasticity, strength, " and sufficient support."

Secondly, "obtaining the inclination of the rails either by " superposing an inclined iron plate on the upper surface of " the sleeper rail, or, preferably by moulding the latter of the " desired shape for receiving the foot of a Vignole rail or the " hollow part necessary for lodging an ordinary double-headed " rail."

Thirdly, "various means of attaching the rail to the sleeper " either by the aid of gibs and cotters or cramps in the case of " single rails, as also by means of an ordinary cast-iron chair " or chairs in the form of angle irons connected to the sleepers " in the case of double-headed rails."

The sleepers are moulded hot on leaving the rolls and the holes for the gibs and cotters are made while the sleeper is still in the mould.

[Printed, 2*s*. 10*d*. Drawings.]

A.D. 1864, February 17.—N° 407.

JOWETT, Henry Alfred.—"Improvements in securing or "fixing rails for the construction of the permanent way of rail-"ways."

While the rail is hot from the rolls, the inventor punches a slot in the web of the rail at the distance of every sleeper. Immediately the slot is made he drives in a piece of cold wrought-iron plate about eight inches long by the width of the slot, and three-quarters of an inch thick, so that "by the contraction of the rail "the cold plate becomes a fixture, and answers the purpose of a "foot or bearing surface to be spiked to the wooden sleeper in "place of the present cast-iron chair." The sleeper is to be grooved to take the lower part of the rail. When the joint of two rails comes upon a sleeper, the inventor punches "the slot in "the end of each rail," and rolls the iron plate, "with a shoulder "thereon, to fit up to the under side of the top head of the rail, "thereby making a fish plate and bolting the same in the usual "manner." The invention is also applicable to existing systems.

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 18.—N° 417.

WATTEEU, Emile.—(*A communication from Charles Ryan.*)—(*Provisional protection only.*)—"Machinery for making railway "spikes, rivets, bolt blanks, and other similar articles."

The machinery "consists of a pair of feeding rollers with "cams, by which the bar of heated iron or other metal is drawn "into the machine and the end thereof is" shaped and cut off; "these rollers have an intermittent rotary motion." The end of the bar being cut off "it is taken hold off by a pair of gripping "claws, by which it is held in a die, the upper part of which is "connected to a lever, this lever is brought down upon the spike ". . . . and securely holds it while the heading ram is brought "against the end of it to form the head, the lever is then raised, "and the railway spike or other article is pushed forward by the "portion of the bar behind it, which has then been taken hold "of by the gripping claws which cause a fresh portion of the "bar to be drawn under the lever for having the head formed "on it."

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 20.—N° 438.

HAWORTH, John.—(*Provisional protection only.*)—" Improve-" ments in the construction and protection of the permanent " way of railways."

The inventor makes his rails of T iron or steel and drives the middle flange or tongue of the rail into a groove in the longitudinal wood sleepers, "which are made by preference narrower " at the top than the bottom. The rails are screwed or spiked at " intervals to the sleepers. At the joints of the rails the ends " fit in a sheet or rolled iron or steel shoe, which is also let into " the sleeper." The inventor's system of ballasting is also applicable to permanent way of ordinary construction. He banks the ballast "level or about level with the outer edges of the rails, " and about an inch and a half below the level of the inner " edges of the rails, and in both cases the ballast is bevelled off " to shed the water." Drain pipes are laid or a gutter is made between the rails, and the ballast, at each side of the rails, is covered with hot asphalte, which, in its turn, is sprinkled with sand while warm to prevent it taking fire.

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 22.—N° 444.

BROOKES, William.—(*A communication from Léon Ulens.*)—" A new or improved metallic permanent way for railways," consisting of metallic T-shaped longitudinal sleepers, the vertical webs or flanges being in the ballast and the others upon the surface. Each sleeper is formed on its upper surface with a longitudinal groove or cavity to receive the foot of the rail, the inside edge of the groove being undercut and the outside edge inclined outwardly. The undercut side of the groove holds the foot of the rail firmly on the inside and on the outside the foot is held down by nuts screwing on to bolts in the sleeper. The sleepers are fished at the joints and the two lines joined by ties.

[Printed, 10*d*. Drawing.]

A.D. 1864, March 1.—N° 510. (* *)

ROBINSON, Joseph.—(*A communication from John Kennedy.*)—" Improved machinery for rolling railroad and other bars."

Three "high rolls," used for rolling railroad or other bars are so arranged that the bars are rolled and reduced as they pass, both forward and backward; at each pass the "fin" formed at the preceding pass is rolled down; "yielding guides" or their equivalents are used for causing the bar to pass from the roll and prevent it from winding round it. Feed rollers, worked by belts or suitable gearing are used for feeding the work into the forming rolls, where heavy bars are operated upon.

[Printed, 10*d*. Drawing.]

A.D. 1864, March 8.—N° 569.

PRICE, James, and DONOVAN, Richard Edward.—" Im-" provements in the means and apparatus for preventing collisions " on railways, and for lessening the effects of the same."

The principle of this invention may be summed up generally in the following portion of the Specification :—" Gradually ex-" pending the force of concussion arising from a moving train, " locomotive engine, or truck, running against the blocked end " of a terminus or blind siding, by causing an object, against " which the train or locomotive engine strikes, to make one or " more bars, rods, or plates, pass through one or more dies or one " or more dies or cutters pass along one or more bars, whereby " the said rods, bars, or plates, are drawn out, compressed, cut, " sheared, or planed, or otherwise destructively acted upon in such " manner that the momentum of the train, locomotive or truck is " thereby expended."

[Printed, 1*s*. Drawing.]

A.D. 1864, March 8.—N° 572.

MOIR, William, and SERJEANT, Charles Eldon.—" Im-" provements in railways and railway carriages."

This invention consists in placing " a continuous line or way " parallel to and on the outside of either side of the rails of rail-" ways," and upon the upper surface of these second rails are placed at intervals sheaves or pulleys revolving on fixed axles. The carriages intended to travel on these rails are constructed with grooves or channels on either side, which grooves or channels bear upon the pulleys or sheaves, fixed in the outer rails. The ordinary permanent way is used only by the locomotive. In point of fact, the position of wheels and rails as they exist at present is changed in this system; that is, the wheels are fixed and the rails, which are attached to the carriages, progress over them, instead of the wheels progressing over the rails.

[Printed, 5*s*. Drawings.]

A.D. 1864, March 15.—N° 654.

TREGASKIS, Thomas Philip. — "Improvements in street "railways."

The proposed railway is to be constructed on each side of a street, the 'up' line on one side, and the 'down' line on the other; "the rails to be carried by a series of arches supported "upon pillars or columns placed (in single file) at the outside "edge of the pavement or footpath and between it and the "roadway." "There are to be three rails, the central one being "much higher than the outer ones," and to serve as a guide. On steep gradients racks are to be placed alongside of the rails, into which an "inner rim of teeth" on the wheels will gear. At the stations a platform is to be erected over the pavement or footway and on a level with the carriages.

The carriages to be used are also described.

[Printed, 8*d*. Drawing.]

A.D. 1864, March 16.—N° 669.

FONTAINEMOREAU, Peter Armand le Comte de.—(*A communication from Henry Place.*)—(*Provisional protection not allowed.*) — "Improvements in rendering useful the enclosures of "railways," by planting fruit trees, &c., and training them on a wire fencing, so that when such trees are fully grown a good barrier would result.

[Printed, 4*d*. No Drawings.]

A.D. 1864, March 16.—N° 680.

VON KANIG, Wilhelm Adolf.—"Improvements in railway "telegraphs and signals, and also in the permanent way and "carriages, for preventing railway accidents."

The inventor forms a continuous system of line signals, which can be operated by the trains in motion. He says, "in order to "accomplish this between the two lines of rails, or in any other "convenient position, I erect a series of hollow signal posts "fitted with rising and falling vanes and coloured lamps and "extending from station to station. I construct the signals and

" actuating mechanism of these posts together by a running wire,
" chain, or cord, the latter being wholly or partially enclosed in
" a pipe or trough. At each end of the wire connecting two
" of these posts and signals together I fix a winding wheel,
" upon the axis of which I mount a lever, which is depressed by
" the wheel of the engine or first carriage passing over the
" same. By the depression of these levers, the winding wheels
" are turned, and the wires are pulled and raise and lower the
" vanes, turn the lamps, or otherwise actuate the signals as
" required."

Another part of the invention refers to the use of guide wheels for keeping the carriages on the rails. In the Provisional Specification the use of a central rail in combination with guide wheels is described, but the inventor does not appear to make any claim to such central rail in his final specification.

The rest of the invention is described in other series of abridgments.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1864, March 23.—N° 736.

HEAD, THOMAS HOWARD, and SMITH, HENRY.—" Improve-" ments in moulding and in machinery used therein," by means of which the inventors mould " pipes, railway chairs, wheels, and " other castings."

The apparatus for moulding chairs consists of a " bed plate or " table" shaped like a trough or basin, having a kind of piston " capable of being elevated or depressed in the trough. On this piston is placed the pattern after which the moulding box is put over it and the sand rammed in in the usual way. The bed plate and box attached to it are then turned over on axes provided for that purpose, in which position the mould box is placed on a travelling carriage, the pattern removed by withdrawing the piston to which it is attached, and the bed plate turned back for a repetition of the process.

[Printed, 1*s.* 4*d.* No Drawings.]

A.D. 1864, March 26.—N° 758.

RAMMELL, THOMAS WEBSTER.—" Improvements in pneu-" matic railways and tubes and in apparatus employed therewith." The first part of this invention relates to lines of great length, to work which "with greater efficiency" the inventor places "at "convenient points along them two or more ejectors to work in "concert, and so that either exhaustion or compression may be "applied at each to the propulsion of the train.

"For the haulage of minerals in mines in order to provide for "the return current without interfering with the general ventilation of the mine" the patentee forms "a double tube in one "division only of which "is placed the tramway," the other "serving for the return current and for the passage of men and "animals." "Such a tube is readily formed by constructing a "wall or brattice along the middle of a gallery," or two distinct galleries may be formed in the first instance.

The next portion of the Specification relates to the valve door. In the improved system double doors are substituted for the single door and they open horizontally instead of vertically. Various arrangements for buffing the doors, and of the triggers and cams used to open them, are described.

Parcels and goods trains are to be stopped by "skid breaks "placed between the rails within the station at proper points." These are arranged "so that they may be raised or depressed to "the degree required to act upon the under surface of the truck" which is plated with metal.

"In the case of parcels and goods tubes" the inventor prefers "to work the terminal apparatus from a raised platform above "the tube where the spindles of the door terminate."

"In the case of parcels and goods tubes," the inventor makes the trucks "with a stout upper framework or sole plate, having "recesses in it to receive the upper part of the wheels. The "framework is supported upon short axles fixed separately in the "wheels and takes a double bearing upon each. The body of "the truck is hung to the framework underneath with proper "bolts, and the ends are secured to it above. The draw bars and "buffers are likewise attached to it."

Passenger carriages are hung "as low as possible by affixing the "springs to the under side of the axles, and allowing the wheels "to penetrate the floor in boxed openings." The doorways are at the ends of the carriages and the seats are ranged on either side. The doors are sliding and packed. The patentee forms "the external sail board of wood or metal to within about three "inches of the inner contour of the tube." The edging for this consists of "strips of leather, caoutchouc, or some tough material,

" with bristles or fibre inserted between them, and projecting " beyond in the manner of a brush."

To afford facilities for turning sharp curves, one wheel only of each pair is fixed to the axle.

When the tube is too large to be cast in one piece, it is to be built up of segments of various shapes, as described in the Specification.

The permanent way for goods lines is laid upon " wood packing " and held in position by metal lugs or projections cast or formed " along channels in the tube." " The packing pieces " are made in pairs of flat wedges, which, when drawn apart, allow of a rail " being inserted beneath the lugs, and when driven together fix " it securely up to and against such lugs."

In passenger tubes the sleepers are laid on the base plate of the tube, with a layer of felt intervening. The space is filled up with ballast and the whole floored or paved over to " an even surface " corresponding in level " with the tops of the rails.

The remainder of the patent relates to the " ejectors " or " centrifugal discs," and chiefly consists of improvements on the inventors previous patent N° 2718, A.D. 1860. The prominent object of these improvements is to provide greater strength of construction.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1864, March 30.—N° 789.

BONNEVILLE, Henri Adrien.—(*A communication from François Conrad Beaufays and Jean François Delchef.*)—" Improvements in the construction of railways."

By means of this invention the inventors reverse the direction of a locomotive or carriage without the aid of a turntable. The contrivance simply consists of two curved lines of rails intersecting one another and the main line, the junctions being furnished with switches.

[Printed, 8*d*. Drawing.]

A.D. 1864, April 1.—N° 807. (* *)

STOTT, Elijah.—" Improvements in the manufacture of rails " for railways, which improvements may also be applied to the " manufacture of bars for the tyres of railway wheels, and for

" other purposes to which the said bars are or may be applicable."

Bars of iron are made with one or more faces of steel suitable for being formed into tyres, or rails. A pile is made by taking a bar or slab of wrought or puddled iron, and forming a groove in one face of it and inserting a bar of steel. The compound bar is piled with other bars of wrought iron, and is heated and rolled. If two faces of steel are required for the finished bar or slab, the lowest as well as the uppermost slab of the pile is made to consist of a compound slab of iron and steel.

[Printed, 8*d*. Drawings.]

A.D. 1864, April 6.—N° 861. (* *)

PRATT, WILLIAM THOMAS CASSEL.—" A new method of, and " apparatus for, enabling the points on railways to be shifted, " and signals worked by an attendant in the train while the train " is in motion."

The apparatus consists of an iron plate or bar fixed in a frame at the centre, rising above the surface gradually, sloping off at the ends, having a weight attached to one end resting on a block to prevent jar in the rise and fall; this plate or bar is attached by a crank to an iron rod and vertical lever; the other end of the iron rod acts by means of another crank upon a shifting rail, between which and the main rail is a groove to receive stones and other obstructions, which might otherwise impede the motion or prevent its action. Connected with the engine, carriages, &c. is a small wheel or wheels, under the control of the engine driver or guard by means of a handle. When it is required to move the train to a siding or to another line, the guard, if the train is being backed, or the engine driver, if it is going forward, by moving the handle attached to the small wheel or wheels, will cause pressure to be made on the iron plate or bar, which, by means of the rod, opens the shifting rails or tongues; after the train has passed, the rails or tongues will return to their former position. The apparatus for working the signals consists of a lever with a weight at one end, and a rod and chain or wire at the other; the rod is attached by a crank to the rod which works the signals, and the chain or wire forms the connecting medium between the apparatus and the lever which shifts the points. The signals may also be acted upon independently of the points. By means of a rocking *lever* a bell can be rung at any required distance.

Claim.—"The method and apparatus described for enabling "the points on railways to be shifted, and signals worked, by an "attendant in the train while the train is in motion."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1864, April 6.—N° 863.

JOHNSON, John Henry.—(*A communication from Miguel de Bergue.*)—"Improvements in the permanent way of railways." There are several systems described in this Specification, viz. :—

An arrangement of wrought or cast-iron sleepers hollow, or trough-shaped on the under side. "Some of these sleepers are "made to extend across the way so as to carry both the rails, "and between them other intermediate sleepers of the same form, "but shorter, are employed." Flat-bottomed or double-headed rails may be used with these sleepers, being secured by bolts and clips and the latter form also by a groove in the sleeper.

A system of "cast-iron plate sleepers of a rectangular or other "convenient form in plan, but having their under surface formed "by the intersection at right angles of two semi-cylinders with "their convex surfaces downwards." A raised edge is cast round the upper surface of the sleeper and on this the rail rests, held down by a "clip piece." These sleepers are tied together at intervals.

The use of chairs having "a projecting central web" on their under sides, which web "will be situate between the inner sides "of two longitudinal sleepers laid parallel side by side, one end "of the chair resting upon one sleeper and the other end upon "the other sleeper;" or a "single sleeper may be used with a "flat-bottomed rail; it will simply require to have two ribs cast "thereon at right angles to the rail, and upon which the rail rests. "A projection or stop is cast on each of these ribs for the outer "edge of the rail foot to bear against." The rail is secured by a "clip piece."

Lastly, a chair, suitable for double and single-headed rails, of such design that the rail is suspended "with its head resting "upon the tops of the two jaws, whilst its foot may be left clear "of the chair."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1864, April 11.—N° 907.

EARNSHAW, Alfred.—(*Provisional protection only.*)—"Improved means of connecting rails for railways, which means are

" also applicable for connecting beams and girders, and for other " similar purposes."

The inventor proposes the use of a "double-locking plate or " 'fish,'" the transverse section of which would resemble in form the letter H. The ends of the rails to be joined are inserted between the plates, and corresponding notches are cut in the ends of the webs of the rails for the cross piece or web of the 'fish.' At certain intervals a "locking plate with the web only at one end " of the plates" is to be used. In this case the slot in the web of the rail is to be lengthened and a bolt passed through "that " part of the plates where there is no web, and also through " the web of the rail, so that upon removing this bolt the locking " plate can be slidden endwise entirely on to the one end of one " rail, so as to allow the rail to be lifted straight up without " sliding it endwise."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 21.—N° 996.

WADKIN, Henry,—"Improvements in apparatus for working " railway points and signals of railways."

The inventor claims "constructing the rods, or their equivalents, that serve to communicate motion to points and signals " of railways, of two or more lengths, and connecting the contiguous extremities of such lengths to the opposite ends of one " or more double-ended levers or their equivalents," for the purpose of providing for expansion and contraction due to variations of temperature.

[Printed, 10*d*. Drawing.]

A.D. 1864, April 23.—N° 1035.

GRICE, Frederic Groom, and BENNETT, Henry.—"Improvements in machinery for the manufacture of hollow iron keys or wedges for fixing rails in railway chairs, which said machinery is also applicable to the manufacture of hollow railway " spikes and hollow iron sleepers for railways."

In this machinery a pair of cutters first cut off the required length of hot metal. The cut off piece is then placed in a hollow bed or die and stamped by a plunger. Thence it passes under the action of a mandril and dies. The hollow key or wedge is then finally perfected by completing the folding down of the edges. A modification of this machinery is also described.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1864, May 11.—N° 1195.

ALISON, Alexander, and HALLIWELL, James.—"Im-"provements in atmospheric railways." The patentees claim—

1. "The valve extending the entire length of the tube" and "composed of short plates or links." "These plates are secured "together by means of a strip or sole of leather."

2. The curved rod employed to lift the valve for the passage of the piston rod, and to return it after the piston rod has passed.

3. The use of a piston with two heads, situated about eight feet apart. The piston rod is placed between these two heads. Thus steadiness is secured. Air is admitted to the space between the heads, "thereby preventing pressure upon the valve near the "piston rod." A valve is fitted to each head.

4. Stopping the train by opening the valve in the forward or rear piston head as the case may be, and thereby destroying the vacuum. Valves are also placed "at suitable distances along "the line for the purpose of destroying the vacuum in front of "the piston, and creating a partial vacuum in the rear."

5. Crossings and switches as described.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1864, May 18.—N° 1260. (* *)

FAGG, George.—(*Provisional protection only.*)—"Improvements "in paving roads and ways, parts of which improvements are also "applicable to the permanent way of railways."

The leading features of this invention are thus set forth:—

"I propose by my invention to construct a pavement present-"ing a surface of stone or wood, or both in combination, in such "manner that there shall be a space left on every side of the "stone or blocks, so as to afford a good longitudinal and trans-"verse holding power for the feet of horses, and to permit of the "running away of the rain and mud, and of the descent of the "dust and dirt.

"Now I propose to effect these objects by a totally new con-"struction of pavement. I form the bed of the roadway (above "which the pavement is to be made) of concrete covered with "a waterproof cement, if necessary, or of any other such like

" materials or compounds suitable for the purpose. This bed
" should be formed of an arched or sloping form from the central
" line, in order to permit of the slush and rain running to
" the sides, and passing into the drains. It is above this bed
" that my roadway is to be constructed and supported. I propose
" to lay a series of blocks or sleepers of stone, iron, or
" timber below the edges of the kerbs, on which blocks or sleepers
" I rest transverse girders or beams of iron extending across the
" entire road, in one or more lengths according to the width of
" the road or longitudinal girders or beams in line with the roadway.
" These beams or girders are to be inverted T iron, the
" base resting on the blocks. The vertical portion or division
" of the iron is to be provided with transverse divisions or frames
" on each side, if necessary, for the reception of the paving
" blocks of stone or wood; these paving blocks will rise an inch
" or two above the flange, so that gutters will be formed running
" across or in the line of the road, and between each stone; these
" gutters or channels may be about half an inch wide, more or
" less, according to the width of the flanges or divisions. The
" blocks might be made so as to fit the spaces accurately, or if
" necessary a small quantity of cement might be used to set them
" firmly in the iron sockets. Now, in order to permit of the
" passage of the rain, mud, and dust, below and between the
" blocks of pavement, a transverse or longitudinal space is left
" between the beams or girders, so that a narrow opening is left
" completely through the construction, and in communication
" with the concrete and cemented bedway below the ironwork.
" These spaces or openings, with the short longitudinal transverse
" gutters running therein, serve for the exit of the wet and dust
" from the surface of the roadway, and the arched or sloping bed
" then carries away everything to the drains, so that the road or
" street is always kept clean. I propose to make the surface of
" the road perfectly flat, since there can be no necessity for
" sloping the surface as is now done, and the flat or plane surface
" will be most beneficial for traffic, and for the footing of horses.
" I propose to strengthen the iron girders or wooden beams by
" means of longitudinal or transverse supports either of inverted
" T iron, or other form, placed at intervals of about eight feet
" apart, and resting on the concrete. In any case proper spaces or
" openings should be left in these supports for the lateral flowing
" of the slush and rain, probably arched forms of iron would be
" most suitable for the purpose. The beams or girders for the

" reception of the blocks may be made of an uniform thickness " or strength, or they may be deeper in the centre if thought " desirable. Or the frames and sockets may be supported by " arched beams, stretchers, or girders, connected at each end by " tie rods in the usual manner of forming such work. This " method would allow of a slight elasticity or spring in the road, " and would tend to lessen the jar occasioned by the passage of " heavy traffic. I also propose to apply similar arched and " yielding supports to sustain the longitudinal sleepers of the " permanent way of railways, or the transverse sleepers laid " thereon, where longitudinal sleepers are not used. By these " means the jolting or jumping motion of the wheels of engines " and carriages would be avoided, since the bearing of the rails " would be equal at every point, instead of as now, unequal at all " points on and between the sleepers or stone blocks. When I " employ wooden beams or supports for the reception of the " paving blocks, I cut suitable recesses therein according to the " shape of the blocks or otherwise, and face each beam with iron " plating to hold such blocks firmly in position. The beams or " girders may be formed sufficiently wide to contain one, two, " three, or more rows of stones as may be found most advan- " tageous. The surface of the blocks may be of any desired " shape and dimensions; I should prefer, however, to make them " square, and about four inches each way, but this would be " determined by experience. Should any portion of the road " require repair, or should it be necessary to take any part up for " other purposes, it will be easy to remove the blocks and girders, " and to replace them again. It is evident that it will be im- " possible for the surface of the roadway to become uneven, and " thus a very great durability will result. I do not limit myself " to any particular form of girder or beam, or to the arrangement " and shape of the sockets or frames to contain the blocks, since " many forms may be devised for effecting these purposes without " departing from the main objects of the invention as first " stated; I shall define them more particularly in the Final " Specification."

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 23.—N° 1288.

HOLMES, Joseph Ellicott.—(*Provisional protection only.*) —" Certain improvements in the raising, lowering, or conveying

" of fluids or solid bodies by atmospheric pressure, and in the " manner of creating and adapting a vacuum to effect such " purposes."

This invention consists in creating a vacuum by the use of explosive substances, which vacuum may be used, among others, for the purposes of conveying "goods or passengers through " pneumatic dispatch tubes." The patentee explodes the necessary compound in a vessel; the products of combustion rush from the chamber into the open air through valves, which immediately close. A vacuum is thus formed in the vessel, and as the latter communicates by another valve with the despatch tube, the parcels or other things are drawn through, or rather forced through by the atmospheric pressure at the other end.

[Printed, 8*d*. Drawing.]

A.D. 1864, May 25.—N° 1297.

MOULTON, George.—" Improvements in turntables applicable " to overhead railways."

" This invention consists in the arrangement and adaptation of " turntables to overhead railways employed in transporting heavy " goods " in warehouses and other places. " The various lines " of railway are connected by hangers to the beams of the ceil- " ing." To this overhead beam the inventor fixes a " hollow " cylinder or frame of the same depth as the hangers which sup- " port the rails. In the interior of this cylinder there is a pro- " jecting cylindrical ledge " carrying the rollers or pulleys which serve to support the turntable proper. This turntable or frame is pierced with openings sufficiently large to admit the carriage, which consists of a plate of iron vertically hung between two wheels, the lower end of the plate carrying the goods by means of a hook or otherwise. When the carriage enters the turntable it releases a catch which secures the turntable in its position. It may then be turned, and on leaving the turntable the catch comes again into operation.

[Printed, 10*d*. Drawing.]

A.D. 1864, May 26.—N° 1305.

HOLIDAY, Richard.—(*Provisional protection only.*)—" Certain " improvements in railway chairs, in chairs for points, and levers " *for* points," consisting in,—

1. "Substituting a metal key (for securing the rails to the " chairs) instead of the ordinary wooden keys, and in securely " fastening the same by means of a bolt and nut. The outer " jaw of the chair". is bevilled, "and the metal key wedge " shaped to fit it. Along the middle of the key" is made "a " groove, into which the point of the bolt passes. The sole of " the groove is tapered the opposite way of the key taper, so that " when the key has a tendency to slip back the bolt becomes " tighter."

2. "Fixing one of these chairs for points by casting an elon- " gated eye or slot in the key, and thus making up the extra " thickness of keys usual for points."

3. "Fixing a short arm to the lever for points, through which " arm" is passed "a screwed connecting rod, by altering which " screw" contractions and expansions of the draw rods are allowed for.

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 30.—N° 1333.

GREENWAY, Charles. — (*Provisional protection only.*)— " Improvements in railway turntables."

"The table is caused to turn on a fixed central upright post, " the lower end of which is fixed. Within this post, which is " hollow, a spindle is received and turns. The upper end of the " spindle is fixed to the centre of the table; at the upper end of " the hollow fixed post is fixed a boss or box in which there are " a series of vertical cylinders or rollers around the spindle of " the table." Thus the upper part of the spindle is free to turn with as little friction as possible. A similar "boss or box" is fitted near the lower extremity of the fixed post, and this "box" is "suspended to the table by upright suspending rods, and " there are diagonal stays applied to the outer" circumferences of the "box" and the table.

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 30.—N° 1338.

HALL, Collinson.—"Improvements in ploughs and in ma- " chinery or apparatus for working the same and other agricul- " tural implements by steam." This invention relates to the following subjects:—

1. "Ploughs for steam ploughing."

2. Using two or more engines to drive one drum.

3. "A travelling railroad" for agricultural engines, "or for "propelling drums to travel upon." This "railroad is formed "of angle iron," and is prevented from yielding laterally by "means of iron struts." In the drawing when the railway is shown as applied to purposes of supporting propelling drums, the flange or vertical limb of the angle iron is outside one wheel of a pair and inside the other. The wheel runs on the horizontal limb of the angle-iron. The iron struts are driven in the ground and bear against the vertical limb of the angle iron.

4. "Rope or chain porters."

5. "The employ of two sectional drums of different diameters "or with a different number of sections on the same shaft."

[Printed, 1*s.* 2*d.* Drawing.]

A.D. 1864, June 1.—N° 1357.

DERING, George Edward.—"Improvements in fastenings for "the permanent way of railways."

This invention relates to certain spring fastenings for which Letters Patent were granted on the 23rd day of November, 1860, (No. 2867).

Firstly, the inventor finds it preferable to cool his fastenings when at a high temperature by plunging into water instead of tempering them.

Secondly, in order to economise material and obtain strength, the fastenings are formed "with corrugations or with ribs or "prominences."

Thirdly, "in joining the ends of rails by means of" spring clips, "instead of forming the clips so as to embrace the rails "closely," the inventor finds it advantageous "to allow a sufficient amount of space on one side or both, for the insertion of "a key or fish-plate between the rail and the inside of the "clip."

Fourthly, the inventor introduces "a combined spring clip and "chair, the upper part or jaw of which holds the rail ends "securely in position by its elastic force, and the lower part, "having an extended base, rests upon a sleeper, and may have "holes and be fixed down to the sleeper by means" of spring treenails or otherwise.

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 8.—Nº 1423.

BRAGG, Aston, and BRIDGEMAN, George William.—(*Provisional protection only.*)—" Improvements in the construc-
" tion of screws, whereby they are rendered applicable to lifting,
" propelling, and to various other useful purposes."

The patentees say :—" We form one end of a length of the
" screw with a socket, and the other end with a plug, and to
" unite one length to another the plug is inserted in the socket,
" and secured therein by a bolt and nut, or bolts and nuts, or
" otherwise. By uniting a number of lengths made in this
" manner, screws of great length and power are constructed,
" and on having rotary motion communicated to them are cap-
" able of being applied to many useful purposes, and, amongst
" others, to" the inclines of railways for the propulsion of trains, to similar purposes in tunnels and underground railways, and to the conveyance of earth and rubbish from place to place, in making tunnels, sewers, railways, &c.

[Printed, 4*d.* No Drawings.]

A.D. 1864, June 13.—Nº 1457.

GRANT, John.—" Improvements in the construction of trucks
" and turntables for portable railways."

The improved turntable consists of a circle or ring of iron, laid on the surface of the ground, upon which rotates, by means of a central pin, a single pair of rails braced together. " The
" pair of rails may be made to point in any direction, and
" brought into connection alternately with any one of two or
" more lines laid from the turntable, which lines may be at any
" required angle to each other."

[Printed, 10*d.* Drawing.]

A.D. 1864, June 13.—Nº 1461.

BROOMAN, Richard Archibald.—(*A communication from Henry James Rouse.*)—" Improvements in engine pits for railways."

This invention consists in constructing engine pits for railways of iron instead of brick or stone. Thus they may be placed in situations where trains may run over them at full speed, " which
" would be dangerous if the pits were made only of brick or
" stone and with timber, as is usual."

The inventor adds guard rails in such places.

[Printed, 2*s.* Drawings.]

A.D. 1864, June 16.—Nº 1490.

EDWARDS, John.—(*Provisional protection only.*)—" Improvements in the permanent way of railways."

The inventor thus describes his invention. It consists in " making iron bowl sleepers with two half chairs on the top, " placed about three inches apart. The rail is dropped in between " these half chairs, the sleeper is then turned round and the rail " becomes fixed between the half chairs. I use angle or guttar iron " for the tie rods, which are made in two parts, and are bolted " together in the middle of the road after they are fixed to the " sleepers by passing a bolt through the sleeper and screwing it " into the tie bar. Also in making a sleeper of suitable form " about two feet long; on this sleeper I fix curved steel springs, " which are then fixed to the rails; these springs are made to " carry the rails, forming an elastic iron way; bow springs are " placed in pockets under the rails to help carry the load. A ti " bar of angle half tube or guttar iron is passed into the sleeper " and held in its position by a bolt passing through into the tie " bar. Sometimes I make this sleeper of small size to act as an " elastic chair for fixing to cross sleepers. Also in making an " iron sleeper about two feet long; on this sleeper, at each end, " on one side I form two half chairs, on the other side, in the " middle, I form one half chair; the rail is then dropped into " its place, a filling piece is driven between the one half chair " and the rail, and is held in its place by dropping a plug into " a hole partly formed in the chair and filling piece, or by corrugating the chair and filling piece; a tie bar is passed through " to hold the road to gauge, as before described. Also in making " a bowl sleeper with suitable holes to receive bolts; on this " sleeper I place two half chairs, which may be made of wrought " or cast iron; the bolts are then passed through and are made " to screw into the tie bar, which is made either of angle, half " tube or guttar iron. Also in making a compound rail, the base " of this rail is made sometimes in two parts, and sometimes I " make the base rail in the form of a deep guttar or bridge rail; " between this base rail I place a suitably formed top rail, which made of the best iron or steel; this top rail is then he base rail, and is thus held in position; this rail is ordinary chairs or placed on a sleeper between springs lescribed."

No Drawings.]

A.D. 1864, June 16.—N° 1491.

TRUSS Sidney.—(*Provisional protection only.*)—"Improve-
"ments in the construction of rails for the permanent way of
"railways and tramways." The inventor proposes to construct rails "with three or more heads." When these rails are constructed hollow "for some purposes" they are to be filled with wood or other substances for "strength and solidity."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 16.—N° 1494.

MUIR, Matthew Andrew and **McIlwham** James.—"Im-
"provements in and relating to railway chairs and sleepers."

The invention comprises,—

Making the metal key and bolster "with a vertical curvature as
"well as with the horizontal curvature formerly given to them."

Constructing "sleeper chairs with provision for fixing the tie
"or gauge bars on the upper side." A vertical flange is cast on the upper side of the sleeper, against which flange the tie or
"gauge bar is bolted. A lip is formed on the top edge of the
"flange to hold the bar down, and the screw bolt is by pre-
"ference held in a slot or notch with which the flange is cast."

[Printed, 10*d*. Drawing.]

A.D. 1864, June 21.—N° 1541.

PHILLIPS, Henry.—"Improvements in the gearing of railway
"hoists worked by turbines, and the preservation of the water
"which has passed through the turbine for supplying the tanks
"of engines and for station purposes." The inventor says, "on
"the shaft of the turbine I fix two drums or pulleys, connected
"by ropes or belts to two loose drums or pulleys on the shaft of
"the hoist, one of the ropes or belts being crossed and the other
"open, and for fixing the drums or pulleys to the shaft as
"required, I employ forks or clutches worked by a lever, which
"arrangement is for the purpose of using the turbine only,
"when the weight is being lifted. The said turbine is of such
"dimensions and power as the hoist requires," and the water after it has passed through the turbine from the main, is collected in tanks for supplying locomotives or for other purposes connected with a railway station.

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 21.—N° 1544.

GEDGE, William Edward.—(*A communication from Jean Claude Meunier.*) — (*Provisional protection only.*) — "Improvements in the permanent way of railways." It is proposed by the inventor to replace wooden or iron sleepers by sleepers of hard stone, resting on a bed of beton or cement. "In order that these sleepers may not render the way too hard, the rails will rest on bearings or chairs of cork set in stone, and as these cork chairs cannot elongate under the pressure of the trains, they will preserve their elasticity for an indefinite period." The rails may be secured by "two wooden wedges, which will slide in rebates or embrasures made in the breadth of the sleeper;" or another way as the following:—"On each side of the rail and the cork bearing or chair, a hole slightly enlarged at its base will be made in the stone, a bolt, the lower part of which will be divided, and form spring, will be introduced into the hole, where it will be firmly held by the spreading of the spring; the head of this bolt will be furnished with a plate forming collar and fitting regularly on the base of the rail, and on this plate will be screwed a nut, so that the tightening or loosening may be effected at will."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 28.—N° 1617.

GEDGE, William Edward.—*A communication from François Nicaud.*)—(*Provisional protection only.*)—"Improvements in the permanent way of railways."

This invention relates to that class of way in which cross bars are used in combination with longitudinal or circular sleepers. Nine different methods of connecting the cross-bar with the chairs are illustrated. In some cases the ends of the cross-bars are bent in various ways, and in another, the cast iron is run on to the ends of the wrought cross-bar.

The inventor also claims the use of felt, placed between cast and wrought parts, especially under the rail.

[Printed, 2*s*. 4*d*. Drawings.]

A.D. 1864, July 1.—N° 1638.

CHELL, Frederick Ludewig Hahn.—Certain improve-
in apparatus by means of which air, gas, or vapour is to

be removed from "tubes, pipes, tunnels, pans, retorts, or other " vessels." The exhaustion is produced by creating an induced current from the receptacle to be exhausted by means of a jet of steam.

The inventor thus causes a " current of air to pass in a given " direction" which current may "remove either vapour or gases" or put "objects in motion, such as carriages, waggons, or carts, " in tunnels or tubes."

[Printed, 6*d*. Drawing.]

A.D. 1864, July 5.—N° 1673.

WILSON, James Edwards.—" Improvements in constructing " the permanent way of railways."

The inventor prefers that "the road or foundation for the " permanent way, should be formed of broken stones, as in making " common roads," and that broken stones should be filled in nearly to the level of the upper surface of the rails. " The " transverse sleepers are of wrought iron, rolled to an H-form, " and are used horizontally thus I. The lower flanges of the " rails are screwed to the transverse sleepers, the screws entering " through the top flange of the sleeper and passing into the web " which connects the upper and lower flanges." All the holes are drilled and tapped by machinery to secure uniformity. The ends of the rails are fished and the screws passing through the web, and fish plates are right and left-handed, the holes being tapped accordingly, the fish plates are also bent round the bottom of the rail to prevent deflection. The inventor makes no claim as to the rail..

[Printed, 6*d*. Drawing.]

A.D. 1864, July 7.—N° 1683. (* *)

MARSDEN, Edward Marsland.—" An improved method of " propelling carriages and weights up and down inclines and " uprights."

This invention consists, firstly, " in the employment of a weight, " say that of a train of carriages, proceeding by gravity alone, or " aided by steam, horse, or other power, down an incline or up- " right to produce a vacuum or partial vacuum in an atmospheric " tube behind a piston in such tube, and to which the weight is " connected, in order that on the carriages or weight attaining the "bottom of the incline or upright the same or other similar carriages or weight, equal to or less or greater than that of the "carriages or weight which have descended, may be connected to "the piston, and by the vacuum on one side, and atmospheric "pressure on the other side thereof, may be drawn or propelled "to the top of the incline or upright with or without the aid of "horse, steam, or other power. The area of the piston must be "proportioned to the load and to the incline; the steeper the "incline the greater must be the area of the piston."

Secondly, in the "employment of a continuous atmospheric "tube, one part carried from the top to the bottom of an incline "or upright, and the other part from the bottom to the top. A "piston connected to a carriage or weight starting from the top "of the incline or upright drives a similar piston connected to a "carriage or weight from the bottom to the top of the incline or "upright, the one descending in one part, the other ascending in "the other part of the continuous tube. As in the former case, "the movements must be assisted by steam, horse, or other "power."

Thirdly, "in the employment of an atmospheric tube extending "from the bottom of an incline to the top, and down another "incline. In fitting pistons therein and in connecting weights "or carriages to such pistons in such manner that one carriage "or weight shall be at the top of the incline and another carriage "or weight at the bottom of the opposite incline, then, on the "carriage or weight descending one incline, the other carriage or "weight will be caused to ascend the opposite incline; the pressure of the atmosphere being allowed to act in the back of the "piston of that carriage or weight at the bottom of the incline. "As before," the movements must be "aided by steam, horse, or "other power."

[Printed, 10*d.* Drawing.]

A.D. 1864, July 11.—N° 1717.

BILLUPS, JONATHAN EDWIN.—(*Provisional protection only.*)— "Improvements in the permanent way of railways." An improved sleeper constructed of two rectangular sheets of iron bent semi-elliptically, and connected by a bar of iron. "The sleeper "may be made in one or three pieces. If in one, the bar and ends will be formed of one plate; the ends or 'rectangular sheets' being afterwards bent. If made in three pieces, the bar is welded, rivetted, or bolted to the ends. The ends may be bent in a semicircle or other curve if desired. Chairs may then be secured to the ends, or if flat-bottomed rails be used they may be connected to the sleepers by bolts or rivets.

[Printed, 6*d*. Drawing.]

A.D. 1864, July 12.—N° 1725.

SMITH, Zephaniah Bridgewater and **RICHARDS,** John.—" Improvements in railway chairs."

These chairs consist of two pieces of wrought iron cut from rolled bars." "The said pieces or halves of the chairs are " of such a figure that, when placed on either side of the rail, " their upper parts fit the body and base of the rail." Thus the use of wooden keys is rendered unnecessary. "Each of the " pieces is furnished with a flange at its base, one end of each " flange passing under the rail. By means of pins each half of " the chair is fixed to the sleeper." The rail rests on the flange under it.

[Printed, 10*d*. Drawing.]

A.D. 1864, July 16.—N° 1793.

ASKEW, Charles.—(*Provisional protection only.*)—" Improvements in the permanent way of railways." The rail used in this way is single headed, and the bottom of the web is expanded into a " dovetail enlargement." The object of this last is to prevent it rising between the angle pieces which form the chair. A bolt passes through the angle pieces and the web of the rail. The ends of the rails are fished by angle pieces, similar in section to those used as chairs.

[Printed, 6*d*. Drawing.]

A.D. 1864, July 27.—N° 1873. (* *)

ANDERSON, William.—" Improved apparatus applicable to " the working of moving parts of railway tracks, and of the " signals connected therewith, and of other instruments required " to be operated in a predetermined order."

The first head of this invention relates " to the simplifying of " the work of pointsmen and signalmen, and to enable them to

" adjust the switches and signals in a manner that will ensure " the proper ways being open and the proper signals being set for " the time being." For this object the patentee provides an apparatus operating upon the principal of the jacquard in looms. To each of the levers which actuate the points and signals the patentee attaches one of a series of horizontal sliding bars, which are arranged parallel to each other, with their free ends standing in front of a transverse sliding bar which acts as a stop to the movement of the sliding rods, except when it is designed to set their operating levers in action. This bar is to be furnished with holes arranged so as to permit the rods to slide freely through the bar when the movement of their respective operating levers is required. The sliding bar is to be connected to a selecting lever which moves over the face of a quadrant and springs into notches formed therein to fix it in position, the several notches indicating a particular position of the switches and of the signals in connection with the apparatus.

The second head of the invention relates "to the regulation of " the course of supply of liquids and fluids where it is essential " that one passage or valve should be opened before another is " closed to avoid the risk of accidents."

[Printed, 10*d*. Drawing.]

A.D. 1864, July 28.—N° 1882.

LIVESEY, James and EDWARDS, John.—" Improvements " in the permanent way of railways and carriages for the same." This invention comprises the use of hollow metallic sleepers having openings at the top to facilitate packing, such openings being closed by lids. The rail is secured in its place by means of a corrugated key and to fixed points " somewhat distant from " the key or centre jaw." This key also acts as a fish plate, when pierced with two or more slot holes for the bolts. The inventors also describe "an elastic chair bent out of a sheet of " steel or iron, with a base plate of wrought or cast iron, in any " convenient form, to prevent the ends of the chair spreading, " and thus retain by a comparatively light section of metal great " resistance, and giving a sufficient amount of elasticity."

The buffers described in the Specification consist of spiral springs with the buffer rods passing through the centre. In one form the spiral spring is " fixed on the buffer rod outside, dispensing

" altogether with the hollow chamber usually employed." Another form consists in an arrangement of two springs, base to base. While "the outer spring is being compressed, the buffer rod is " travelling through and compressing the inner springs by means " of the sliding base plate" between the two springs.

[Printed, 10*d*. Drawing.]

A.D. 1864, August 1.—N° 1908. (* *)

EASTWOOD, CHARLES.—" Improvements in machinery or " apparatus for sweeping the platforms of railway stations and " footpaths."

The object of this invention is to dispense with the use of the " ordinary long-handled brush applied manually."

The patentee says:—I effect this by means of a framework " (rectangular by preference) of cast iron or other suitable material " supported on wheels in the front part, and carrying in the back " part a cylindrical brush free to revolve on its bearings, such " brush being adjusted by means of set screws applied in the " bearings, or in any convenient manner. I place a box for the " reception of dust or dirt in the bottom of the front part of the " frame, open to and in juxtaposition with the brush. A grooved " pulley on one of the wheel axles communicates motion to a " similar grooved pulley on the axle carrying the brush by means " of a band or belt, and when the attendant pulls the machine or " apparatus by means of a handle affixed to the front part of the " frame, rotary motion is given to the brush (which is in contact " with the ground) by the method above described, and dust or " dirt is carried into the receptacle in the bottom of the framework. The brush may obviously be constructed of any desired " or convenient length, and thus a larger area of platform or " footpath is cleansed at one time than is possible by the hand " brush."

[Printed, 10*d*. Drawing.]

A.D. 1864, August 4.—N° 1938.

SOUL, MATTHEW AUGUSTUS.—(*A communication from John Gregory.*)—" Improvements in fastenings for railway rails, applicable wholly or in part to other purposes."

Constructing dogs or spikes, &c. in two halves, on the front of one of which is formed a projection of an angular or other shape.

The other half is made straight, and when driven into the sleeper at the back of the other half, it drives the angular projection into the wood, and so prevents the spike or dog from becoming loose.

Shaping wooden keys with a recess in the side into which "gutta percha or other elastic material liable to be partially "dissolved by heat is inserted." When driven into the chair, "this elastic material becomes compressed, thus firmly securing "the key in chair."

[Printed, 10*d*. Drawings.]

A.D. 1864, August 11.—N° 1997.

LANG, JOSEPH. — "Certain improvements in apparatus for "securing rails on the permanent way of railways."

"The improvement consists in the use of two horizontal plates, "one sliding horizontally within the other, from each of which "the bearings or rail supporting portions project upwards, one "of such projecting supports being furnished at the joints of the "rails with pins or studs, the other being perforated with corresponding holes. When the rail is to be secured (having been "previously drilled with holes corresponding to the pins), it is "placed between the two supports, which are then brought in "close contact with the rail, and a 'split cotter' is driven into "the sliding plates, which renders the rail secure, the pins "passing through the rail and 'fish plates' (if used), and into "the opposite support of the chair, thus bolting all together. "If required, pieces of wood may be inserted in the supports to "soften the concussion. The afore-mentioned pins or studs are "dispensed with in the intermediate chairs."

[Printed, 10*d*. Drawing.]

A.D. 1864, August 11.—N° 2004.

HEMMING, SAMUEL CHARLES.—(*Provisional protection only.*) —"Improvements in the permanent way of railways."

The inventor proposes to make use of longitudinal sleepers formed out of a sheet of corrugated iron bent into the form of an arch, the rail being laid along the ridge of the arch. The under surfaces of the chairs are grooved to fit the corrugations, and the sleepers are connected by transverse tie bars.

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 13.—N° 2027.

CORDNER, RICHARD.—(*Provisional protection only.*)—"An "improved railway sleeper," consisting of "frames of iron joined "or held together transversely by iron rods. These frames may "be of cast or malleable iron, having on their upper surface "suitable raised caps or ledges adapted for holding securely the "wooden block to which the chair for carrying the rail is to be "fastened."

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 24.—N° 2087. (* *)

GREAVES, HUGH.—(*Provisional protection only.*)—"An im"proved apparatus for landing passengers and merchandise, "which apparatus is applicable also to other purposes."

This invention relates to constructing, on piles or otherwise, a tramway, on which a "travelling stage or platform" is mounted in such manner that although the tramway may at times be wholly or partially submerged by the rising of the tide, the stage or platform may always be above water. This stage or platform is arranged for the reception of passengers or merchandise, and may be caused to travel along the tramway by having a steam engine mounted thereon, giving motion to the wheels of the stage, or to toothed wheels carried by the stage, and in gear with racks laid down along the tramway. As in many cases, however, the inclination of the shore is too great for these arrangements to answer satisfactorily, drums and ropes are then used for drawing the stage up and lowering it down the tramway. A rope may be fixed at each end and passed round a drum or drums mounted on the stage; or the rope may be fixed at the "land end" only, and wound upon the drum or drums, or unwound therefrom, to raise or lower the stage respectively.

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 25.—N° 2102. (* *)

COTTAM, GEORGE HALLEN, and COTTAM, HENRY RICHARD.—"Improvements in machinery employed in transferring railway "carriages from one line of rails to another, and in apparatus "used for lifting and adjusting rails for railways."

By this invention the transverse rails and turntables usually employed in moving carriages from one line of rails to another are dispensed with, and a "suitable arrangement of overhead "traveller, and apparatus connected therewith," are used, a carriage being turned round if desirable while being operated upon. The traveller may be actuated by a stationary engine, or an engine may be mounted upon and moved with the traveller. A frame is suspended from chains passing round barrels mounted in the traveller, and in the centre of this frame is an opening through which is passed an axis which sustains a second frame lower than the first, the lower frame being furnished with rods, which may be connected to the carriage to be moved by means of suitable hooks.

For lifting the rails of a railway a small hydraulic cylinder is used, which is supported by "legs," so as to be raised to some distance from the ground. Connected to the ram of this cylinder are rods or chains furnished with "grips or holders," which are made to grasp the rail to be lifted, such lifting being effected by pumping water into the cylinder.

[Printed, 10*d*. Drawing.]

A.D. 1864, August 30.—N° 2130.

CLARK, WILLIAM.—(*A communication from Jacques Antoine Barthelemy Balbi and François Pommerol.*)—"Improvements in "railway apparatus for the better prevention of collisions and "other accidents."

The patentee places between the rails a number of catches arranged in a zig-zag, and all connected by bars. Thus there are two parallel rows of catches, and they are so contrived that all in one row stand erect, while all those in the other row are depressed. To the locomotive is attached a "stop piece on one "side." If this stop piece meets the up-standing catches it immediately, by a combination of levers, shuts off steam and releases the locomotive from the train to which it is coupled by a coupling of novel form. As all the catches on one side are raised while those on the other side are depressed, two trains could not travel towards one another on the same line of rails.

Various other improvements relating to the couplings, breaks, and locomotive guard are described.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1864, September 7.—N° 2184.

WARD, WILLIAM HENRY.—(*Provisional protection only.*)—"Improvements in tramways and in carriages to be used upon "them, the same being applicable to railways and their carriages."

The tramway "consists in the use of one or more parallel "grooved rails, of such construction as not to cause any unevenness of roadway, placed in the roadbed with their grooves "upward, so as to admit of a corresponding projection or flanch "on the tread of the carriage wheels to roll in, and retain the "coach on the line of rails."

Various improvements in carriages for tramways are also described.

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 9.—N° 2207.

BARLOW, PETER WILLIAM.—"Improvemments in constructing and working railways, and in constructing railway tunnels."

The inventor proposes to make use of stationary power for working railways where there are many stoppages at short intervals. The stationary power is to work an endless rope, from which the trains are to be released when they have attained sufficient speed to take them to the next station. The inventor prefers to construct his line so that there shall be an ascent to the station on each side. For constructing tunnels the inventor makes use of a cylinder of iron, which is constantly forced forward as the earth is removed from the front of it. Iron rings, constituting the permanent lining of the tunnel, are put together inside this cylinder.

[Printed, 10*d*. Drawing.]

A.D. 1864, September 16.—N° 2257.

MOY, THOMAS.—(*Provisional protection only.*)—"Improvements "in the mode of propelling trains on railways."

This invention "has for its object the propulsion of trains on "railways by means of the mutual action and reaction of wheels, "or rollers and rails, or bars with undulating surfaces, consisting of a series of longitudinal curves formed on the wave line "principle. The said wheels or rollers are caused to press on "or against the undulating surfaces of the rails or bars, and the "trains are propelled as required by the dynamic action of the

" wheels or rollers on such surfaces, instead of by the bite of the " wheels on the rails as usual, thereby obviating the liability to " slip incident to the ordinary mode of propelling." These rails may be laid in pairs, replacing the ordinary rails, or the ordinary rails may be used, and a central waved rail added. The " wheels " or rollers may be either connected to vibrating arms or other " suitable mechanism mounted on locomotives, and caused to act " on stationary rails or bars, or they may be connected to stationary vibrating mechanism, and caused to act on the undulating surfaces of a continuous jointed rail or bar under the " several carriages of a train, thereby dispensing with the use of " locomotives."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 17.—N° 2275.

JEFFREYS, MARMADUKE DARELL.—" Improvements in rail" way turntables."

The object of the patentee is to utilise the steam power of a locomotive in working the turntable on which it stands. A portion of the rails beneath the driving wheels is cut away, and friction wheels are mounted on a shaft immediately below the table. The action of the driving wheels of the locomotive on these friction wheels serves to turn the turntable. Where there are coupled wheels in the locomotive, dummy friction wheels must be provided for the running wheels to rest upon.

[Printed, 10*d*. Drawing.]

A.D. 1864, September 20.—N° 2304.

STRUVÉ, WILLIAM PRICE.—" Improvements in the manufac" ture of slabs or blocks of malleable iron."

The inventor thus describes the essence of his process :—

" I construct the finery and hearth of a size suitable to the " block, blooms, or slabs required. I refine the iron in the " finery to the extent I think necessary, and then run it into " the hearth, and there apply blast, and by constant breaking up " the iron expose all parts to the action of the blast, and with " the help of some hammer cinder in the usual way practised " in South Wales, bring it to nature in the form of a large lump. " This lump is then taken and placed on its end on the anvil " of a large forge hammer and hammered, and then placed on its

" sides and well hammered; by this means the face or top of the " lump and the bottom of the lump are forced out by means of " the hammering, and become the ends of the bloom. These " two ends are then well upset by hammering, so as to square " up the ends. The bloom is again re-heated to a white heat, " and the hammering resumed under a powerful forge hammer " and the ends upset again so as to give them a finished form; " the bloom is again re-heated to a white heat, and drawn out " into a block or slab. The bloom or slab is now ready to be " re-heated for rolling into a tyre or slab for boiler plates or " into any other article."

The inventor specifies the use of this process in rail making."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 20.—N° 2305.

CLARK, William.—(*A communication from Constant Jouffroy Duméry.*)—Improvements in the permanent way of railways.

The patentee says:—" I first take a piece of iron and roll it of " a T form, the width and depth of which are such that on in-" verting the T, the width of its base shall present a sufficient " surface to sustain the weight and prevent the crushing of the " line or sinking of the ground, while the vertical part offers the " requisite additional support to the rail for sustaining the " heaviest loads. A single-headed rail, also obtained by rolling, " is cemented by bolts to the vertical part of the T iron in such " a manner as to form but one whole, presenting the appearance " of a Vignolle rail of the amplest dimensions, and constructed " of two parts breaking joint with each other; cross sleepers are " applied for connecting the two rails of a line, and serve to " complete the arrangement. The ends of these cross sleepers " are turned up in a hook form, so that a single bolt is sufficient " at each end to prevent any deviation from the plane of the " sleepers, and to give the whole perfect rigidity." The ground is hardened under the rails previous to their being laid.

[Printed, 10*d*. Drawings.]

A.D. 1864, September 24.—N° 2344.

BRIDGEWATER, Henry.—" An improved mode of manufac-" turing railway crossings."

The patentee says :—" The object of this invention is to improve " the manufacture of spliced crossings by increasing their structural strength. The spliced crossings I form of ordinary " double-headed rails, cutting away the flanges on the abutting " sides of the rails that are to be joined together, so as to give " the rails when joined the proper taper form. At the end of the " splice rail I cut away the heads for a short distance, leaving only " the web of the rail, which laps upon the web of the V or point " rail like a fish plate, and the flanges of the V or point rail I cut " away, so as to form shoulders for the shoulders of the splice " rail to abut against. The rails thus fitted together I secure by " means of rivets or bolts passed through the webs of both rails. " To give the crossing the proper form I taper off the point " rail in the usual way. Spliced crossings thus constructed " are reversible crossings, but it will be obvious that this novel " system of splicing is equally applicable to crossings that are " not reversible."

[Printed, 10*d*. Drawing.]

A.D. 1864, September 28.—N° 2375.

LISTER, James.—" Improvements in theodolites, levels, and " other instruments, which improvements are more especially " applicable to setting out surface widths of railway slopes or " other inclined planes."

By means of the improvements described in this Specification the telescope of the instrument is enabled " to move or revolve in " a plane at any angle with the horizon." Moreover, certain " scales or graduations on the vertical arc " are introduced " for " determining the angle of the slope or inclined plane at any " given point or distance from the instrument." The invention facilitates " the operation of setting out the surface widths of " slopes or battee pegs required in the execution of railway, " canal, and other earthworks." The telescope " being made to " turn upon an axis at a right angle to the plane of the slope or " inclination to be set out, and the focal axis of the telescope " being in the plane of that slope, any number of points required " within the range of the instrument can be determined by the " intersection of the cross wire with the surface by one operation."

[Printed, 8*d*. Drawings.]

A.D. 1864, October 4.—N° 2445.

GREENWAY, Charles. — "Improvements in railway turn-"tables."

The central axis or pillar of the turntable "rests by its lower "end on a step or bearing, whilst it is surrounded by upright "antifriction rollers or cylinders which are arranged to turn "freely within a hollow frame or upright cylinder which is fixed "to the foundation," and stayed thereto. "The upright cylinder "and the antifriction cylinders or rollers rise up nearly to the "under side of the table, so that the supporting bearing con-"structed as above explained, presents a very extended support."

[Printed, 8*d*. Drawing.]

A.D. 1864, October 21.—N° 2612.

DONISTHORPE, George Edmund.—"Improvements in se-"curing or fixing the rail or tramways used when getting coal "and other minerals by machinery." This invention consists in "holding in position the rails upon which machines used in "getting coal and other minerals run by posts or pillars wedged "or held between the floor and roof of the mine."

[Printed, 10*d*. Drawing.]

A.D. 1864, October 28.—N° 2677.

JOWETT, Henry Alfred, JOWETT, John Eaton, and MUSCHAMP, John Bell.—"Improvements in the construc-"tion of rails and bearers for the same, for the permanent way "of railways."

The patentees make their double-headed rails with about the same running surface, but with a web "not exceeding one inch "in depth." The flanges make right angles with the web. This rail is let into a groove in the sleepers, and plates of metal are inserted into the groove on each side of the rail. These plates are bolted down to the sleepers. For fishing, similar plates are used, but they are of greater length. Or bars connected by bolts "with hook-formed heads passing through the webs of the rails" may be used. "To obviate the necessity of grooving sleepers" an angle iron bearer of a **Z** shape may be used. The upper edge of this bearer fits the groove in the rail, and the lower edge is bolted to the sleeper.

[Printed, 8*d*. Drawing.]

A.D. 1864, November 7.—N° 2747.

YOUNG, James Denoon.—" Improvements in the construction " of rolled iron railway bars or metals, girders, beams, joists, and " angle irons." This invention consists in manufacturing rails with a vertically corrugated web instead of with a plain web as hitherto. Thus the inventor proposes to economise material. The fish plates are corrugated to fit the rails, and the corrugations serve to secure the nuts of the bolts. Girders, beams, angle irons, &c., are also to be made in this way.

[Printed, 4*d.* No Drawings.]

A.D. 1864, November 10.—N° 2797.

BROCKETT, Henry.—Improvements in the permanent way of railways."

The sleepers are quadrangular at their bases, and rise considerably, so as to form a deep internal chamber or series of chambers for reception of the ballast. These sleepers are formed with undercut grooves, at right angles to the line of rails, in which grooves are held the heads of the bolt that serve to secure the " holding down plates. The heads of the bolts also rest on the ends of the tie bars, which are dovetailed and let into corresponding recesses in the sleepers. The tie bar may also be secured in another way, namely, by passing the ends through horizontal apertures in the sleepers, and then inserting cotters through holes vertically at right angles to the bar, which cotters engage in notches in the tie bars, and are held down by the rail which covers their heads. The keys are made in two parts, one of which is recessed to receive a portion of the other part. A piece of vulcanized india-rubber or other soft material is placed in the recess between the two parts.

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1864, November 16.—N° 2857. (* *)

HOLIDAY, Richard.—" Improvements in the mode of locking " or securing the levers used to work railway signals and points."

The patentee states that instead of the rocking shafts and cranks described in Saxby's patent N° 1754, A.D. 1860, and Chamber's patent, N° 31, A.D. 1860 to move the notched locking or sliding plates into the position required to secure or lock the hand levers of railway signals and points not in use in giving any required signal, or changing the corresponding points, he uses "for each

" point lever a bar or plate provided with an oblique slot, in which " slot the lever in use works backwards and forwards freely, and " which by virtue of the inclined plane of such slot causes the " locking plate to slide horizontally, and so brings all the notches " or projections on the edge of the plate opposite to all the levers " out of use, and so fixes them that none of the levers except " those in connexion with the points and signals to be changed " can be moved." Each lever used to move any particular point is provided with one of these locking or sliding plates, each such plate having an oblique or inclined slot for the lever to work in freely, and projections or teeth on its edge to lock or secure each lever out of use, so that no point can be moved nor "signal be " given inconsistent with that in action by the lever working in " such slot."

The patentee states that "he does not claim the use of sliding " plates with notches or teeth formed on the edge, or in the " surface of such plates." But what he does claim "is the " moving of such locking or sliding plates, horizontally or " otherwise, by means of an oblique slot formed in such plate, " and in which the lever to be moved works, so as to bring the " notches or teeth formed on the edge or in the plate into the " proper position to lock all the levers out of use."

[Printed, 4*d*. No Drawings.]

A.D. 1864, November 17.—N° 2874.

WILSON, Henry.—" Improvements in machinery for sawing, " adzing, and boring sleepers for railways."

The sleepers are carried on endless belts and brought under six circular saws. Two of the saws square the ends of the sleeper and the other four, acting in pairs, make cuts of a certain depth into the sleeper, between which cuts the wood is to be removed for the chairs. This is done by cutters revolving horizontally, to which the sleeper is conveyed by the endless bands. The holes are bored by vertical boring tools, capable of being set at an angle to one another. The four bits are driven by an endless band carried round the friction pulleys in the form of a figure 8.

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1864, November 25.—N° 2950.

KNOWLES, Thomas.—(*Provisional protection only.*) —" Im- " provements in switches or points for railways."

The object of the inventor is so to prepare the rail that, when the upper part is worn, it can be turned. This object he attains by making both "the top and bottom the same shape or parallel "with each other," also planing "the end to a fine point or "feather edge." The rail when turned is placed on the opposite "side of the line.

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 8.—N° 3055.

LIVESEY, JAMES, and EDWARDS, JOHN.—"Improvements "in the permanent way of railways."

The inventors construct hollow sleepers of iron or steel and pack them with cork, india-rubber or other elastic substances. They also form a trough, on the sleeper, to receive the chair, and in the trough they place sawdust, springs, or cuttings of cork. The patent also comprises a chair "for suspending the rail or "otherwise" having a loose jaw secured by a bolt. This bolt may be arranged in various positions. When it is horizontal it passes through the rail "firmly holding the loose jaw and at the same "time binding" the rail to the chair. When it is vertical or inclined, the rail may be removed by simply loosening the nut. The jaw and key have indents on them and into these indents a plug is driven to fasten the key. The tie bar is secured by a curved cotter. "The tie bar is passed into the body of the sleeper until "the cotter hole reaches the centre of the trough or recess; the "curved cotter is then driven in . . . . and when driven in the "force required to bend it binds the tie bar immovably to the "sleeper." The cotters and cotter holes are sometimes serrated.

[Printed, 10*d*. Drawing.]

A.D. 1864, December 8.—N° 3060.

CROCKFORD, CHARLES.—"Improvements in traction on rail- "ways, more especially adapted to steep gradients."

This invention consists in the use, in various ways, of an additional angular-topped rail or pair of such rails, in combination with a correspondingly grooved drum, or second wheel, or grooved driving wheel, for the purpose of obtaining friction sufficient to prevent slip.

[Printed, 6*d*. Drawing.]

A.D. 1864, December 10.—N° 3068.

TRUSS, SIDNEY.—(*Provisional protection only.*)—"Improvements in the construction of rails for the permanent way of "railways and tramways."

This invention comprises the following:—

The construction of "hollow metal rails."

Filling the hollow rails with wood or other material to prevent concussion.

The "construction of solid rails with three or more heads or "wearing surfaces."

The "construction of metal rails with wood to form part of the "head or wearing surfaces, by wood being secured in a longitudinal hollow cavity in the rail, or to the side or sides of the rail, "by screw bolts" or otherwise.

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 13.—N° 3081.

ADAMS, WILLIAM BRIDGES.—"Improvements in railways and "tramways." Permanent way, consisting of sleepers made of sheet iron plates flat or cupped, on which the rails are secured by angle iron brackets, chairs, or otherwise.

These sleepers are joined by tie bars "secured to the sleepers "by hook-head or other bolts passing through the sleeper, or "through sleeper and brackets, a projection being formed on "the foot of each bracket which passes through the wrought "sleeper and notches into the cross tie bar, and so keeps the gauge "accurate."

[Printed, 10*d*. Drawing.]

A.D. 1864, December 17.—N° 3137. (* *)

EASTMAN, ZEBINA.—"Improvements in rails or trams for "streets and other roads or ways, in wheels to use thereon, and "in the working parts of carriages or waggons to be used there-"with."

The first part of this invention consists in constructing rails with grooves in the upper surfaces of "concave" or "cupped" form, the rail forming in effect a portion of a hollow cylinder of small diameter. A rib or flange is formed along the lower portion of the rail, which maintains it in position when inserted into the ground, the rail being sunk therein so as to bring the upper edges thereof level with the surface of such ground, and the two lines of rails being connected together by cross bars or ties, or in some other suitable manner. If desirable, however, the rails may be laid upon wooden sleepers, in which case the rib or flange is not required. And a railway may be formed either by using two lines of these concave rails, or one line of such rails and one line of broad flat rails, this latter arrangement enabling carriages of different widths to travel on the railway, the wheels on one side of such carriages travelling in the hollow of the grooved rail, and those on the other side on some portion or other of the broad flat rail.

The second part of the invention consists in constructing the wheels of carriages with convex rims, so as to adapt them for travelling upon the concave rails already mentioned, these rims being of such dimensions as to "move somewhat loosely" in the grooves of the rails, and so "give the wheels play."

Another part of the invention consists in so constructing and arranging the axletrees of vehicles having four or more wheels that they will readily adapt themselves to passing round curves. In the case of four wheels the axles have each in the centre a circular rim or bed piece on which the body of the vehicle rests, allowing the axles to turn freely, a horizontal bar passing from the centre of one axle to the centre of the other, and the axles being connected thereto by pivots. A connecting rod passes diagonally from a projection on one side of the rim or bed piece of one axle to a similar projection on the contrary side of the rim or bed piece of the other, and, the wheels being loose on the axles, the effect of the whole arrangement is, that in passing round a curve this diagonal rod causes the axles and wheels to assume positions corresponding therewith. In the case of a vehicle with six wheels the several axles are not connected by diagonal rods, but are provided with toothed segments, in gear with each other, and which, when the vehicle is passing round a curve, cause the axles to assume the requisite positions.

[Printed, 10*d*. Drawing.]

A.D. 1864, December 29.—N° 3233.

MATTHEW ANDREW, and McILWHAM, JAMES.—vements in and relating to fastenings for railways."

Spring fastenings, for rails, which may be made in various ways from "strips of malleable iron, steel, or other suitable metal."

For driving in a key of this kind, the inventors "provide a tool "formed with a shoulder to bear on the end edge of the coil, with "a central projecting part to enter within the coil. The tool is of "a length to be held conveniently, and is struck with a hammer upon its outer end." These fastenings may also be used under the rail, to act as cushions. Various modifications, and methods of use are described.

[Printed, 10*d.* Drawing.]

1865.

A.D. 1865, January 2.—N° 6.

SMITH, JOSEPH, junior, and WILLIAMSON, JOHN.—"An "improved method of and apparatus for lubricating the axles or "journals of coal or ironstone waggons or tubs, or of other "carriages, or rolleys used upon tramways or railways, for carrying "mineral or other matter." Lubricating the journals of waggons and other vehicles by means of lubricating wheels placed at intervals on the line.

These wheels are partly sunk below the level of the line and the peripheries are "covered with india-rubber, felt, or other suitable "material." The lower part dips in a reservoir containing lubricating material, and, as the waggons roll along their axles or journals come in contact with the lubricating wheels, "thus "causing them to revolve in the lubricating material."

[Printed, 10*d.* Drawing.]

A.D. 1865, January 18.—N° 147.

JEFFREYS, WILLIAM.—"Improvements in machinery or apparatus for working switches and signals of railways."

The object of this invention is to lock the spring lever handles and others to prevent contradictory signals being given.

The apparatus consist of a series of stops keyed on to a shaft parallel to that on which the spring levers work, and so connected by rods to the point levers that the drawing back of any of the point levers will cause the stops to travel forward and abut against projections formed on the signal levers in such a manner that such of these signal levers as ought not to be used cannot be drawn back, but such of these signal levers as ought to be used are at liberty to be drawn back.

[Printed, 1s. 2d. Drawings.]

A.D. 1865, January 19.—N° 164.

MALLET, Robert. — "Improvements in the permanent way " of railways, and in buckled plates to be used therein, the same " being applicable to the construction of fire-proof buildings, " bridges, and other like structures; also in the machinery or " apparatus for producing such improved plates."

The patentee makes the following claims with reference to the application of buckled plates to permanent way:—

" First, the application of buckled plates to the supporting of " the rails," "whether as isolated sleepers or as transverse or " longitudinal sleepers."

" Second, the combination with buckled plates of yielding or " elastic covers or bridge pieces upon which the rails are secured, " either directly or through the intervention of chairs, with or " without cushions or light timber sleepers between the rail foot " or chair base, and the elastic cover or bridge."

" Third, the forming of the chair in one piece with the elastic " cover or bridge piece of the buckled plate sleeper."

" Fourth, the combination of elastic covers or bridge pieces " with open frames or hollowed plates, so as to give the requisite " elastic bearing to the rails of permanent ways."

The remaining four claims relate to the manufacture and shape of the buckled plates.

[Printed, 1s. Drawing.]

A.D. 1865, January 20.—N° 177.

CLARK, William.—(*A communication from Julien Eugène Cuvier.*)—" Improvements in apparatus for taking up and delivering mails and other parcels in railway trains while in motion."

The mails to be delivered or taken up are fastened to a ring which is hung in a vertical slide, on the carriage if the mails are to be delivered, or on a suitable post on the road if they are to be taken up. The ring is hung in the slide by a double spring which opens to allow the ring to pass and then closes. The taking up of the mails from the carriage or post is effected by a curved arm which passes into the ring and draws it from its place.

[Printed, 1*s*. Drawings.]

A.D. 1865, January 21.—N° 184.

WILSON, JAMES GODFREY.—(*Provisional protection only.*)—"Improvements in the construction of permanent way for rail-"roads."

A combined sleeper and chair, made in either one or two parts, is used by the inventor, which sleeper chair is connected with the one on the opposite side by a tie bar passing through the chair and web of the rail, and secured by a nut or cotter. Or the tie bar may be secured to that portion of the combined sleeper and chair which forms the sleeper, in cases where it may be desirable. A small space is left round the rail to allow of a layer of fibrous packing being introduced. "When the combined sleeper and "chair is made in two parts, those portions of the under side "which forms the seat for the rail will be made to fit into or "fasten into each other."

[Printed, 4*d*. No Drawings.]

A.D. 1865, January 21.—N° 187.

ABEL, CHARLES DENTON.—(*A communication from Charles Louis Ferdinand Vardilhon-Lafilolie.*)—(*Provisional protection only.*)—"Improved apparatus for transmitting letter bags and "parcels to and from railway trains whilst in motion."

The mails to be delivered into the train are placed in a receptacle, so constructed as to open in two halves immediately on the catch being liberated by the train. This receptacle being suspended over the line the mails drop on to the top of the carriage which is netted round to receive them. To deliver the mails from the train the same contrivance is used, only in this case it is attached to the train.

[Printed, 4*d*. No Drawings.]

A.D. 1865, January 31.—N° 269.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Jean Arnaud Emile Laloubère.*)—(*Provisional protection only.*)—

" Improvements in rail and tramways, in laying electric telegraph " wires, and in compositions for insulating the same."

The patentee proposes to carry telegraph wires through pipes, which are to serve as rails.

He says :—" When the rails are circular, I lay them without " sleepers or girders in two parallel trenches or cuttings filled " with concrete up to within a short distance of the rails; I then " fill the remainder of the cuttings up nearly to the surface of " the rails by preference with one of " two bituminous compositions described. " Where a level road is required, I fill up to " the top of the rail, and leave at the right and left thereof a " small gutter for the flanges of the wheels, which I prefer to " be grooved like a pulley. The gutters just mentioned may " be dispensed with if wheels with curved tyres be employed."

[Printed, 4*d*. No Drawing.]

A.D. 1865, January 31.—N° 275.

COLQUHOUN, Ewing Pye, and FERRIS, John Pardoe.— " Improvements in the permanent way of railways."

" The sleepers or blocks are of cast iron, of a form and size best " suited to the soil in which they are to be placed; in the centre " of the sleeper or block is a recess or chamber in which the lower " portion of the chair works; the sleepers or blocks are connected " transversely by tie rods; the chair is also of cast iron, the root " of the jaws terminating in a plate having on the under side a " projecting rim which works up and down freely in the recess or " chambered part of the sleeper, and which serves to keep the " chair in position. On the upper surface of the plate of the " chair are cast the ordinary jaws of a main line chair to carry the " rail in the usual manner. Between the sleeper and the chair, " and surrounding the projecting rim on the under side of the " chair, is an india-rubber ring or washer which acts as a spring " and produces the desired elasticity."

[Printed, 8*d*. Drawing.]

A.D. 1865, February 4.—N° 318.

RICHARDSON, Robert.—" Improvements in railway chairs, " fastenings, and sleepers." The inventor claims the following :—

1. Railway chairs " in which the jaws are cast obliquely with " the base," whereby greater bearing surface is obtained for the rail.

2. Driving the spikes or trenails away from the rail at each side, "whereby the lateral blow of the flanges of the wheels" is more effectually resisted.

3. Constructing spikes or trenails with a gradual enlargement from the head to the point and the use of a key to be driven in with such spikes. Or in one form the key is driven up the centre of the spike from the opposite end.

4. Sleepers of cast iron formed with "an open cellular or honey-" comb structure." The cells are filled up with a mixture of " lime, sand, and tar forming a compact and elastic concrete."

[Printed, 10*d*. Drawing.]

A.D. 1865, February 11.—N° 386.

PORTER, JOHN and PORTER, JAMES.—"Improvements in " the permanent way of railways." This invention relates to the " construction and employment of a railway chair, consisting " of three chairs situated certain distances apart, and connected " together by means of longitudinal bed pieces, upon which the " rail is pressed down by means of loose jaws or stays fixed by " screw bolts," and which "loose jaws" rest against a recess or projection in the chair.

[Printed, 8*d*. Drawing.]

A.D. 1865, February 15.—N° 432. (* *)

LANE, MICHAEL.—"Improvements in apparatus for working " and controlling railway switches, points, and signals."

This invention consists in the employment of a shaft carrying a toothed wheel or ratchet, and a screw thread, which screw thread works through a fixed nut for the purpose of communicating to-and-fro motion to the shaft. The switch or signal lever has connected to it a rod with teeth, which engage into the teeth of the toothed or ratchet wheel upon the shaft. The shaft carries locking bars, which are carried to-and-fro, according to the direction in which the shaft is made to travel by the toothed rod, when acted on in one direction or the other by the switch lever, and these locking bars either hold secure or allow motion to switch or signal levers, according to the direction in which the shaft is made to travel.

[Printed, 8*d*. Drawing.]

A.D. 1865, February 15.—N° 434.

PIERCE, Denison Chauncey.—" Improvements in railway " rails."

In order to deaden concussion, the inventor forms " a groove " along the table of the rail from end to end, and into this " groove " he fits " a strip of wood, by preference oak, and over " it a bar or ribbon of steel. The groove and the steel bar or " ribbon inserted into it are both dovetailed, so that the said bar " or ribbon cannot escape from the groove ; it is driven into the " groove longitudinally before the rail is laid."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1865, February 20.—N° 474.

WARE, George Henry Hibbert.—(*Provisional protection only.*)—" An improved apparatus for shifting points on railways " from an engine or train in motion."

This invention " consists in the employment of a bent lever free " to play horizontally on a fixed stud and connected to a point or " switch bar. The lever carries at each end an arm rising verti- " cally. The point or switch bar carries outside the rails a " weighted lever, or a lever connected by a rod to a spring to " cause the switch or point to remain in the position into which " it had been forced until purposely shifted. The horizontal " lever is bent in such a shape as to be capable of being acted on " by an engine or train on the main line or on the crossing." The engine is fitted with " wedge-shaped or other suitable blocks " which come in contact with one of the arms on the horizontal lever and ensure the points being in a proper position.

[Printed, 4*d.* No Drawings.]

A.D. 1865, February 24.—N° 520.

DONALD, John Kennedy.—(*Provisional protection only.*)— " Improvements in the permanent way and rolling stock of rail- " ways."

The chief object of the inventor is to diminish the jolting of the trains.

" The jolting referred to is partly due to the want of continuity
he rails, and this defect is by this invention partly remedied
aving the rail ends cut obliquely, so that before each wheel

" completely leaves one rail length it is partly supported by the " next one. The defect is more completely remedied by rolling " the rails in halves as though divided vertically and longitudi-" nally. These half rails are bolted together with the joints on " one side disposed between those on the other side, and the " joints are also by preference cut obliquely."

According to another modification, "two plain iron bars are " bolted together with a thickness of wood between them, care " being taken to dispose the joints of the three thicknesses so that " no two joints ever occur together."

The remainder of the Specification relates to the draw springs of rolling stock.

[Printed, 4*d.* No Drawings.]

A.D. 1865, February 27.—N° 544.

HENSON, HENRY HENSON.—(*Provisional protection only.*)—" Improvements in railway chairs, fastenings, and sleepers."

The inventor proposes to obviate the tendency possessed by chairs to be displaced sideways by the thrust of the trains.

To effect this object he places the chairs on an incline, formed either by recessing the sleeper or fixing wedge-shaped pieces of metal upon its surface. Another method is to cause projections on the sleeper to engage in recesses on the under side of the chair or vice versâ. Or he turns the sides of the chair base down against the sides of the sleeper and secures them by bolts, in addition to the ordinary bolts or trenails driven in the top surface. The inventor prefers to drive the bolts or trenails at an angle with the rail, the points diverging from it.

[Printed, 4*d.* No Drawings.]

A.D. 1865, March 1.—N° 575.

BAYLISS, MOSES.—(*Provisional protection only.*)—" An im-" proved machine for pointing or drawing down railway spikes, " and which said improved machine is also applicable for forming " or drawing down the shanks of ordinary spikes and other " articles of irregular shape." The machine for forming railway spikes consists of "two eccentric rolls, geared together, so that " their expanding and contracting surfaces shall simultaneously " operate on the iron intended to be drawn out by this process," Lateral or side rolls are also used, and these "work by contact "with the vertical rolls, and the iron which is being reduced."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 2.—N° 590.

NEWTON, WILLIAM EDWARD.—(*A communication from Ernest Bazin and Jules Hémery.*)—"An improved process and apparatus "for impregnating wood with chemical solutions."

The sleepers or other articles of wood are placed in a suitable receiver and well steamed to open the pores and remove the sap. The preservative solution, as sulphate of copper, is then filled in in a heated state and the penetration assisted by passing currents of magneto-electricity alternately in one direction and the other along the wood. Cold liquor is next allowed to take the place of the hot and the preserving is accomplished.

[Printed, 8*d*. Drawing.]

A.D. 1865, March 3.—N° 598.

LILLIE, Sir JOHN SCOTT.—"Improvements in apparatus for "propulsion by atmospheric pressure."

The carriages are propelled "by a partial exhaustion of the air "on one side of a piston or surface, which piston or surface "passes through a partially closed tunnel, which tunnel may be "constructed underneath or alongside of a railway, having valves "on its side or other convenient part which rise and fall as the "carriages pass, such carriages being attached to this piston "by rods, chains, or ropes." The vacuum is produced by the "attractive force" of a jet of steam.

[Printed, 1*s*. Drawings.]

A.D. 1865, March 9.—N° 661.

JAMES, WILLIAM HENRY.—"Improvements in carriageways "and in carriages for the same." This invention has reference to
ing one, No. 9473, A.D. 1842, and relates to modifications

rs, instead of being fixed in the ground, repose in
d the springs under the cross bearings are dispensed
ends of the rods, bars, or strips are no longer dove-
re merely let into grooves. The carriageways are

formed "either on a level or at various inclinations as required," and not necessarily on a level. "Wheels and pinions actuated by "weights or springs" are substituted for the "weighted bent "levers for giving tension to the several rods," &c. Chairs, ropes, and framework hinged together may also be used instead of rods, bars, or strips of metal. The posts or pillars are sometimes connected by tie or truss rods.

There are also references to the carriages.

[Printed, 6*d.* No Drawings.]

A.D. 1865, March 14.—Nº 709.

DEAS, James.—"Improvements in and connected with levers "for railway switches and signals."

According to this invention there is substituted for the deep rectangular box commonly used for a switch lever, a tubular piece which lies horizontally at or on the surface of the ballast. This tubular piece is attached to a metal plate, over which the ballast is rammed, and it requires no timber framing. The lever is pivoted to the upper side of the tube, and the short arm of the lever works inside the tube, through an aperture in the top side of it. The switch rod enters one end of the tube, and is attached to the lever, the other end of the tube being closed.

The apparatus is capable of modification.

[Printed, 10*d.* Drawing.]

A.D. 1865, March 16.—Nº 738.

LOEDER, William.—(*A communication from Gabriel Dümler.*) —"Improvements in the permanent way of railways.

The inventor claims "a metal sleeper composed of a horizontal "piece, with vertical supports to protect it from displacement."

[Printed, 10*d.* Drawings.]

A.D. 1865, March 16.—Nº 740.

BELL, Robert.—"Improvements in working railway signals, "and in the machinery or apparatus connected therewith."

According to this invention, "the moving of any one handle "lever is caused to operate as may be desired upon any other "lever or set of apparatus, whether for working points or "signals, the operation of one lever being so arranged that it "locks all signals and points contradictory to it, at the same

" time it unlocks the signal which is to be brought next into
" operation; thus any lever can be so arranged as to lock in
" three different ways. For this purpose there is placed in front
" and back of the machine, or in any convenient position thereof,
" one or more bars, on which are placed notched locks to work
" either up or down for the purpose of securing the levers where
" required; this bar, on which are fixed L-shaped or other suitable
" projections, can be wrought by cranks, cams, screws,
" pinions, weights, or other contrivances. The locks are also so
" arranged that two or more signals may forelock any one lever
" if necessary.

"This system of locking the levers at a point high up prevents
" the possibility of moving the points so as to cause an engine
" to 'bite' the points."

[Printed, 10*d*. Drawing.]

A.D. 1865, March 24—N° 832.

LOEDER, WILLIAM.—(*A communication from Gabriel Dümbler.*)—" Improvements in the manufacture or construction of rails for " railways." An improved rail, made in two parts, namely, the body and a loose hood or cap, secured thereon by bolts passing through the web and the two flanges or sides of the cap. The cap may be made of a different metal from the body, and elastic substances may be interposed if desired.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1865, March 25.—N° 844.

HURRY, HENRY COLUMBUS.—" Improvements in railway points " and switches."

The inventor converts " the rail or a portion of the rail of which
" the points or switches of railways are constructed into a spring,
" so as to act in substitution of all other description of heel
" hitherto applied to point or switch rails." The rails are also sawn or slotted in fine notches at intervals " for the purpose of
" regulating the place at which the rails shall bend and yield."

[Printed, 10*d*. Drawing.]

A.D. 1865, March 30.—N° 895.

GREENISH, GEORGE.—(*Provisional protection only.*)—" A new
" or improved arrangement of mechanism for propelling waggons
" in connection with railway hoists."

The improvements "are designed for the purpose of transferring the waggons or 'trucks' from the permanent way of railways to the platform of the hoists employed in connection with such permanent way."

Drums or pulleys are employed, which are supported in bearings fixed to the sides of the hoist and driven by the engine which works the hoist, or by a separate engine. Ropes are attached to the waggons and wound by the drums, so effecting the transfer.

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 1.—N° 923. (* *)

BROOMAN, Richard Archibald.—(*A communication from William Desmond O'Brien.*)—"Improvements in street railways."

This invention consists "in constructing rails of an iron bar formed with a curved under side adapted to and resting upon a corresponding convex surface of a sleeper; the rail is also formed with a curved upper surface with slanting sides or edges, being sectionally of a crescent-like form, thicker in the middle than at the edges, and sufficiently strong where the wheels run upon the rails, while the thinner and slanting sides or edges are only sufficiently thick to guide the wheel flanges, and form a cap to protect the sleeper. When laid upon the sleeper the rails are to be secured by screws passed vertically through them" and into the sleeper. Beneath each of the joints of the rails is inserted a curved metal plate, which prevents the ends of the rails from becoming embedded in the sleeper, "and both the rail and the joint plate direct off any water that falls on the rails, thereby keeping the upper surface of the sleeper, as well as the portion under the joint plates, as dry as possible."

The paving stones of the street may be laid "so as to come up to the top of the rail and level with the same, leaving only a small groove on the inside of the rail for the flange of the wheel to travel in."

[Printed, 8*d*. Drawing.]

A.D. 1865, April 7.—N° 992.

WILKES, Thomas.—"Improvements in machinery for the manufacture of railway bolts, spikes, and other like articles."

In the machines usually employed for this work the dies for the heads are made with taper sides so that the head of the bolt is easily removed from the die. By this improvement the sides of the die are parallel, and the head of the bolt is forced out by a piston which works in the die. The bolts so made have heads with parallel instead of tapered sides.

[Printed, 8*d*. Drawing.]

A.D. 1865, April 22.—N° 1131.

BÜNGER, William.—(*A communication from Moritz Hilf.*)—(*Provisional protection only.*)—" Improvements in the construction " of the permanent way of railways." This invention relates to a permanent way having longitudinal sleepers. The sleepers are of cast iron, trough shaped underneath, with longitudinal ribs. The rails and sleepers are fished together, and the two lines connected by tie bars. Bent rails may be dispensed with " as the " rails are easily bent into the correct curve by fixing them upon " the sleepers, the rivet holes being correctly placed in accordance " with the radius of the curve."

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 25.—N° 1158.

BUCKNILL, John Townsend.—" Improvements in the con- " struction of railway rails and wheels." In order to obtain the requisite adhesion in ascending inclines, the inventor makes " the " heads of the rails wedge-shaped or inclined at the sides, and " flat on the top or table." The tyres of the driving wheels are grooved to correspond with the head of the rail, " so that the " driving wheels rest upon the sides of the rail, and do not bear " on the top or table." The other wheels of the train may run upon the top or table of the rail in the usual manner. This principle may be modified.

[Printed, 8*d*. Drawing.]

A.D. 1865, April 26.—N° 1163.

ECCLES, Richard. —(*A communication from Charles W. Stafford.*)—(*Provisional protection not allowed.*)—" Improvements " in railway chairs and in the mode of securing rails thereto." The patentee forms a groove on one of the inner sides of the chair, and between this groove and the rail he inserts an eccentric key. By turning the key with a spanner or wrench the rail is firmly held. "A small wedge is then inserted through a hole in "the upper part of the chair to pass through a notch or slot "in the" key and thus preserve it in position.

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 11.—N° 1306.

TIJOU, William.—(*Provisional protection only.*)—"Improve-"ments in securing the rails of the permanent way of railways." This invention comprises the use of "a gib and cottar, or of "reversed wedges set up or tightened one against the other and "against the side of the rail by a nut and screw bolt, or by a bolt "tapped into a lug on the gib, or into one of the reversed "wedges." Also a metal key, grooved vertically, in which groove a metal wedge is tightened up "by means of a screw tapped into "it and bearing upon the seat of the chair, or by a screw bolt "secured to it, and passing through a lug in the jaw of the chair, "a nut being employed for drawing up the wedge."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 12.—N° 1321.

WINDER, Richard.—"An improved method of and appa-"ratus for laying single line articulated railways, and a method "of propelling thereon, particularly applicable for agricultural "purposes."

The rail used by the inventor is a single articulated rail carried on longitudinal sleepers. The steam plough or other agricultural implement is fitted with a frame at the end which takes up the rail and removes it laterally for the back journey. The machine is also fitted with spiked pulleys which grip the rail, and also propel the machine. For transport the rail may be coiled round a drum carried on the machine.

[Printed, 8*d*. Drawing.]

A.D. 1865, May 12.—N° 1323.

DONOVAN, Richard Edward, and O'BRIEN, Daniel.—(*Provisional protection only.*)—"Improvements in the means and "apparatus for effecting traction on railways and roads where "traction is used."

The invention consists in pressing the "driving or traction" wheels, which may be vertical or horizontal, against the ordinary rails of railways, or against suitably contrived guide rails or "projections fixed between the rail or upon common roads."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 16.—N° 1362.

CHAVANNE, André.—"A new mail catching apparatus for "bags or packages, without stopping the express trains or "others."

A cylinder, open at both ends, is fixed horizontally on the mail carriage. The mails to be delivered are placed in a cylindrical iron case, which case is placed in the rear end of the cylinder, "and is supported therein by rings on its exterior being slid on "to a rod fixed to the top of the cylinder. The forward end "only of the rod is fixed to the cylinder, so that the rings by "which the mail bag is suspended may slip freely off its rear "end, and so permit the mail bag to pass out of the rear end of "the cylinder." The mail to be picked up is placed in a similar case and hung upon a post in such a manner that it will be received into the open end of the cylinder on the mail carriage. The shock of impact between the picked up mail and the mail already in the open cylinder will drive out the latter, which will be caught on the post. The mail cases are buffed at their ends and a net of tarred rope is attached to a sliding frame in the cylinder to ensure that the picked-up mail shall remain in the cylinder.

[Printed, 8*d*. Drawing.]

A.D. 1865, May 20.—N° 1398.

ARMSTRONG, Joseph.—"Railway crossings."

The inventor constructs "a double-headed reversible crossing "for railways, with wing and point rails all in one piece from an "ingot of steel, bloom of iron, or other suitable material to the "section and angles required by means of forging, pressing, or "otherwise."

The forms of the crossings are described in the inventor's former patent, N° 2530, A.D. 1856, whereby they were cast in one piece in moulds.

Tyres may also be made in a somewhat similar manner, as described.

[Printed, 6*d*. Drawing.]

A.D. 1865, May 29.—N° 1473.

PAGET, Frederick Arthur. — " Improvements in locking " screws and the nuts of bolts, as also in preventing an unequal " straining of their threads."

The locking is effected by means of a steel washer hollowed out on its under side, so that the screwing down of the nut " brings " the washer into a state of initial strain." Thus the surfaces of the threads of the male and female screws are kept in close contact.

[Printed, 8*d*. Drawing.]

A.D. 1865, June 1.—N° 1511.

HUNT, Thomas.—" Improvements in the construction of the " permanent way of railways."

The inventor claims, "first, the dividing of transverse metal " sleepers longitudinally, and forming each half with projections, " which bear against the inner and outer sides or edges of the " rail or rail flanch, the whole being tightened up by wedges or " bolts."

" Second, the dividing longitudinally of a portion only at each " end of a metal transverse sleeper, and securing the solid central " part to the divided portions by bolts."

"Third, the dividing of a metal transverse sleeper into two " or more parts transversely, so that the fracture of one part will " not necessitate the replacing of the entire sleeper."

" Fourth, the application of one or more longitudinal ribs or " corrugations to the under side of a transverse metal sleeper " in order to give stiffness and strength, which ribs may be arranged " to prevent the bolts which secure the rail and sleeper together " from turning round."

[Printed, 10*d*. Drawing.]

A.D. 1865, June 12.—N° 1593.

HIXON, William James.—" Improvements in the permanent " way of railways, and in locomotives applicable thereto."

The patentee dispenses with switches and moveable points. The necessary junction points are fixed on sleepers, " every point " being open sufficiently to permit the passage of the flanges of " the wheels." "At a short distance beyond the points " it is proposed " to lay down a grooved or slotted rail midway between

" the rails and following the curve of the junction across the
" space between the up and down lines. This ground rail serves
" to guide the engine on to and along the points on to another
" line of rails " by means of a guide rod on the engine.

[Printed, 8d. Drawing.]

A.D. 1865, June 23.—Nº 1681.

RAVELLI, Candido. — (*Provisional protection only.*) — " Improvements in turntables."

This invention consists in constructing annular turntables.

In the central opening of the turntable are placed " cylinders
" or drums, which bear against its inner periphery, and while
" supporting it assists its motion. The inner peiphery of the
" turntable is toothed, and is geared into by toothed cylinders
" or wheels worked by an endless chain or chains passing
" round," a capstan in the centre. " The turntable is intended
" chiefly for made-up trains, or for several carriages, though it
" may be used for a single carriage or engine. The engine on
" arriving runs from the ordinary rails on to the turntable, and
" when it has travelled far enough thereon to produce a circular
" motion of the turntable it strikes against a buffer on the table,
" and by the jerk produced, moderated by the engine driver, the
" turntable is put in motion; the impulse thus given is continued
" by means of the capstan. " The tender and carriages
" following the engine leave the ordinary rails and run upon the
" turntable. As soon as the engine comes opposite the line
" upon which the train is intended to run a catch similar to those
" ordinarily used in turntables stops the motion of the turntable."
The engine and tender are then released, and run off the turntable which is again put in motion. The engine being joined to the carriages by a lengthened chain and travelling on the new line continues the turning of the table, " so that the table
" receives carriages from one line of rails and at the same time
" delivers them on to another line."

[Printed 4*d.* No Drawings.]

A.D. 1865, June 24.—Nº 1690.

MUIR, **Matthew Andrew**, and **McILWHAM, James.** — (*Provisional protection only.*)—" Improved sanitary apparatus or
" arrangements for preventing noxious exhalations such as arise

" when coating or treating iron or other articles." This invention consists in means of preventing the diffusion of noxious exhalations in coating articles, such as railway gauge bars, with tar.

"These bars are carried from the fire whereon they are heated, " and are dipped in a horizontal position into a trough containing " tar, and are then laid on rests for the superfluous tar to drip " from them." The dripping trough and rests are covered with a hood and the vapours thus confined are drawn off by any convenient furnace and burned. " An important feature of the hood " is a horizontal diaphragm with which it is fitted inside a little " above its bottom edges, this diaphragm being formed with a " number of perforations which cause the draught to act uniformly " over all parts of the space covered by the hood."

[Printed, 4*d.* No Drawings.]

A.D. 1865, June 26.—N° 1705.

WHITTLE, John.—" Improvements in forming the permanent " way of railways."

In order to form a joint between the ends of two rails, the inventor thickens the web at the ends, " so as nearly to fill up " the hollow channel, and they are cut with scarfs or inclines so " that when the ends of two rails come together they overlap for " several inches." The scarf joint is secured by bolts and nuts, and is supported by a wide chair, keyed with wood in the usual way.

[Printed, 10*d.* Drawing.]

A.D. 1865, June 27.—N° 1713.

KIRKHAM, John.—(*Provisional protection only.*)—" Improve" ments in securing the rails of railways."

This invention " is more particularly applicable to the securing " rails to the chairs at the end of each rail when the ends of the " 'fish plates' are held by the said chairs," but it is also applicable to the intermediate chairs. It consists " in forming the " chairs with a square hole in one jaw, so that the head of a bolt " can pass through the hole and come against the rail or fish " plate, the screw end of the bolt passing through the rail and " fish-plates and wedge or packing (if any), and through the " other jaw of the chair, so that when the screw nut on the bolt " at the outside of the jaw of the chair is secured, the rail or the

" rail and ends of the 'fish plates' and wedges or packing (if " any) will be firmly bound laterally to the chair."

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 1.—N° 1751.

McGREGOR, WILLIAM.—(*Provisional protection only.*)—" Im- " provements in the points and crossings of railways."

The object of this invention " is to produce a crossing for rail- " ways, such that a continuous surface is presented for the wheels " to run upon instead of their having to jump across a gap or " gaps as usual." For this purpose portions of the rail are knuckle-jointed and placed in such a position that as the wheels come upon it the knuckle, so to speak, is straightened and allows the train to pass. A weighted lever returns or doubles the joint after the passage of the train, and in this position one of the limbs of the joint forms the connection between the other line of rails.

[Printed, 10*d*. Drawings.]

A.D. 1865, July 4.—N° 1765.

LABOURET, SYLVAIN BENJAMIN. — (*Provisional protection only.*)—" Improvements in the construction of suspended bridges, " roads, aqueducts, or other ways."

The rails are suspended or attached to a framing and the carriage hangs upon these rails by the wheels. In one case the wheels run between pairs of grooved rails, one above the other, in the other case the wheels run upon a suspended rail, and a horizontal guide wheel attached to the side of the carriage, runs against another rail secured to the posts which carry the overhead rail.

[Printed, 6*d*. Drawing.]

A.D. 1865, July 5.—N° 1771.

GEDGE, WILLIAM EDWARD.—(*A communication from Ernest Michaux.*)—" An improved circular endless railway " for places of amusement.

The locomotive and carriages are partly curved and the wheels on one side are slightly larger than those on the other. Below the rails is a double T-headed rail which is embraced by two friction rollers carried by each of the carriages and prevent them from leaving the rails. The way is bolted on to wooden sleepers, the extremities of the rails "come on to sleepers of half the thick-" ness of the first, and when the but ends of these rails are " in contact the half sleepers are coupled together, and thus give " a thickness equal to the first; the half sleepers are so bolted " that the circular way forms but one very strong whole."

[Printed, 6*d*. Drawing.]

A.D. 1865, July 6.—N° 1786.

JOHNSON, JOHN HENRY.—(*A communication from William Wharton, junior.*)—" Improvements in railway switches."

The main object of this invention is to avoid any interruption or break in the main line at the part where the switch is situated; and to carry this out the switch is so designed that the wheel flanges are allowed to pass *over* the main rails without being in contact therewith.

[Printed, 8*d*. Drawing.]

A.D. 1865, July 12.—N° 1842.

WILSON, JAMES EDWARDS.—" Improvements in the permanent " way of railways."

The first part of this invention consists in supporting the rail upon corrugated sheets of metal, the rails being usually at right angles to the ridges. The two lines of rails are tied together. The second part relates to an elastic support for the rails. At each end of the tie bar are placed what may be termed shoes, and which are plates turned up at their two ends. " One of the rails " is supported over each pair of these shoes by two bent and " elastic plates, which at their upper edges come under the head " of the rail and support it, whilst the lower edges of these two " plates are received into the bent ends of the shoes or plates " which are supported and held in position by the tie bar which " is between them."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1865, July 14.—N° 1852.

BAYLISS, WILLIAM PODMORE. — " Improvements in apparatus for the locomotion of trains on railways by atmospheric " pressure."

A tube of uniform bore is laid between the rails, which tube "has a longitudinal aperture extending along its upper surface." A band of india-rubber or leather forms the valve and within the tube are two pistons at some distance from each other and connected firmly with each other. Each piston has a valve. In front of the carriage is a wheel which presses on the valve and keeps it shut, while in rear of the carriage is an arrangement of pullies for opening the valve. To move the carriage the valve in the rear piston is opened and a vacuum created in front of the other. The pressure of the air admitted into that part of the tube from which the valve band is raised, forces the carriage in the direction of the vacuum.

[Printed, 10*d.* Drawing.]

A.D. 1865, July 19.—N° 1878.

HENDERSON, CONSTANTINE.—(*Provisional protection only.*)—"Improvements in the mode of connecting rails for railways and "tramways."

The inventor proposes to connect rails by a "boltless fish plate," which he describes as follows:—

"Thin plates are cut to a given length and the required thick-"ness, the sides of these plates I cut to an angle of 45 degrees, "more or less; I then prepare the ends of the rails (or they "may be rolled) to a similar angle or degree, which allows the "fish plates to run into the groove or socket parallel with the "wed (*sic.*) or body of the rail on either side. I then bring up "the connecting end of another rail, and having placed them "together, I bring back the fish plate half its length into the "next rail, and securely fix same by a small soft iron or wood "wedge, which cannot move when driven up."

[Printed, 4*d.* No Drawings.]

A.D. 1865, July 29.—N° 1964.

SABEL, EPHRAIM.—(*A communication from Martin Dieudonné Henvaux.*)—"Improvements in the manufacture of iron and "steel."

The gist of this invention is embodied in the following claims:—

"Firstly, the exclusive use of rolls for rolling bar iron or steel "by the two-roll system, when made with the necessary grooves "for roughing and finishing without the aid of separate roughing "rolls and at a single heat, up to flat bars of six inches in width "and round and square bars of seven inches; iron of larger "dimensions requiring separate roughing rolls by the two-roll "method."

"Secondly, the exclusive use of rolls made with the necessary "grooves for roughing and finishing all sorts of bar iron or "steel by the three-roll system at a single heat and without the "use of separate roughing rolls."

Thirdly, an arrangement of trains and furnaces in a rolling mill (separate roughing rolls being dispensed with) with the view to more economical and profitable working.

[Printed, 6*s*. 2*d*. Drawings.]

A.D. 1865, July 31.—N° 1976.

SABEL, EPHRAIM.—(*A communication from Martin Dieudonné Henvaux.*)—"Improvements in the manufacture of iron rails and "girders."

"The invention consists in manufacturing railway rails and "girders (or joists) by rolling the faggot flatwise instead of on "edge, and making the rail head or flange, and the ridges or "flanges on the girders of one single piece of iron, thus con"siderably economizing the use of ('corroyé') prepared iron "and securing a more compact and better finished rail or girder. "The ridged or flanged bars so made replace successfully and "advantageously the usual description of prepared iron, flat "and square, used in the faggots for rails and girders." Each is produced from a single faggot of puddled bar iron. "Each "description or dimension of rail or girder exacts a prepared "ridged or flanged iron, appropriate to the faggot with which it "is to be rolled, except that some will serve for two very similar "dimensions." When the head of the rail is to be of steel the flanged cap to the pile must also be of steel.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1865, August 1.—N° 1987.

DOULL, ALEXANDER.—(*Provisional protection only.*)—"Im"provements in the construction of atmospheric railways and "carriages, and in working the same."

The railway consists of a tunnel or tube through which the trains are worked by vacuums. In front and rear of the train are diaphragms fitted with fringes at their edges to make them as air-tight as possible. In ascending a hill the air is exhausted in front and compressed in the rear, and the opposite is done in descending. The diaphragm is concave on the side towards the compressing engine and convex towards the rarefying engine. "The diaphragms are reversed upon the extremities of their "vertical axis, and are so constructed that portions may be "opened or folded up in order to throw off the propelling "power." In driving tunnels under water, or where water is likely to find its way into the tunnel, the patentee fits two valves into the tunnel at some distance apart. When the space between the two is filled with compressed air, it constitutes an air lock for the rest of the tunnel, so that men and materials can pass to or from the tunnel without lowering the pressure of air therein. The stations are outside the tube, and doors open into the tube from them. When the train is not intended to stop, the doors are not opened. A method of constructing tubes above ground, from rolled bars in combination with other materials, is also described.

[Printed, 6*d*. Drawing.]

A.D. 1865, August 7.—N° 2049.

NEWTON, Alfred Vincent.—(*A communication from Alfred Ely Beach.*)—"An improved mode of and apparatus for "facilitating the transportation and delivery of letters, newspapers, "and other freight." This invention consists in the use of an "endless travelling bag, pouch, receptacle, belt, or canal of such "construction that letters, parcels, and other freight may be readily "deposited in the canal while it is in motion." This endless belt is carried on wheels which run on rails enclosed in tubes. "At "given spots receiving posts and sorting stations are connected "with the tubes, which for convenience in traversing towns may "be placed under the street pavement."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1865, August 14.—N° 2099.

HENSON, William Frederick.—"Improvements in railway "chairs."

The inventor constructs the chair with one side or jaw fitting close to the rail. The other jaw, which is completely detached, is secured to the bed of the chair by a bolt, and is prevented from slipping by a projection on the bed of the chair. This jaw or separate piece bears against the other side of the rail and acts as a key, so taking the place of the ordinary wooden key now used. In some cases the chairs may be cast in one piece and slid on to the rails, "in which case packing may be found neces-" "sary; but where the joints or ends of the railway bars or" "metals meet," the inventor proposes "to continue the sides to" "a greater height for the purpose of fishing the joints of the said" "railway bars or metals." In such "cases a bolt may be passed" "through the side of the chairs."

[Printed, 8*d*. Drawing.]

A.D. 1865, August 25.—N° 2182.

HENSON, Henry Henson.—(*Provisional protection only.*)— "Improvements in railway chairs, fastenings, and sleepers."

The object of this invention is to secure railway chairs to the sleepers in order to prevent their being displaced by the side thrust that they are subjected to by the wheels of passing trains. This is accomplished by setting the chairs on inclines cut in the sleeper, or providing the chair and sleeper with projections and recesses which correspond with one another. According to another method the base of the chair is made of the same width as the sleeper, and lugs or flanges are formed upon it to fit against the sides of the sleeper to which they are secured by bolts driven or screwed into the sleeper.

"Another improvement consists in forming a bolt hole in the" "centre of railway chairs immediately beneath the rail, and in" "driving into such hole a bolt or spike having a countersunk" "head, so that when driven the top of the latter is flush with the" "bed of the rail, and the rail when fixed will thus prevent the" "bolt or spike from rising." A recess or large hole may also be made in the centre of railway chairs immediately beneath the rail, which hole may be filled with wood, the surface of which is raised slightly above the surface of the chair for the rail to rest upon.

The remainder of the Specification relates to a modified iron combined sleeper and chair, in which "the surface of the dished" "plate or bowl is polygonal instead of spherical as heretofore."

[Printed, 4*d*. No Drawings.]

A.D. 1865, August 25.—N° 2183.

ROGERS, William.—(*Provisional protection only.*)—" Improvements in the construction of the permanent way of railways." This invention consists in the use of a chair having "flanges at " an angle with the bed of the chair," by means of which it is attached to a transverse sleeper.

[Printed, 4*d*. No Drawings.]

A.D. 1865, August 25.—N° 2184.

CURLEY, Edwin Augustus.—(*Letters Patent void for want of Final Specification.*)—" Improvements in apparatus by means of " which certain liquids, common air, and certain elastic fluids are " made available in the production of light, and their quantity " regulated and measured, parts of which improvements are applicable for other purposes." A portion of this invention refers to the production of an air pressure which may be used for propelling articles through tubes or pipes, or in atmospheric railways. A rotating drum like that of a wet gas meter is used, or " a series " of bellows resembling the series of measuring chambers of a " dry gas meter." Instead of the rotating drum " one or more " reciprocating pumps sealed with liquid like the large gas receivers used for storing gas at the works" may be used. " Self-acting valves are attached to these, and they are worked " by means of a spring or weight." In other cases " where it is " required to move great volume of air, ... reciprocating " air holders moved by steam or water power" are to be employed.

[Printed, 4*d*. No Drawings.]

A.D. 1865, August 30.—N° 2227.

GREEN, James Cole.—" Improvements of the permanent way " of railways and carriages for the same." In order to afford additional security to trains, the inventor proposes to form railway wheels with two flanges instead of one. Accordingly this Specification comprises "the means of crossing the rails with the " double-flanged wheels by an elevated switch point or table." The inventor also gives increased solidity to the way by a new sleeper, and by inserting a steel dowel in the rail joint. The eper is "rabbeted and sunk upon the top side to the depth of he thickness of the foot of the rail, at an incline of 1 in 20;

" this will form a continual seat or chair for the rail, and the solid " raised fillet an abuttment to prevent expansion of the rails."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1865, September 1.—N° 2256.

CLARK, William.—(*A communication from Jules Vautherin.*)— " Improvements in the permanent way of railways."

" This invention relates to improved means of connecting rails " of various kinds to iron sleepers, especially those of a semi- " tubular form. For single-headed or vignole rails the inclination " towards the inside of the line is obtained by means of a rolled " plate, while the connection is made by a bolt having a washer " underneath the nut, which embraces on the one hand the foot " of the rail, and on the other a similar part formed by rolling " on the foot or base plate; the head of the bolt is also squared. " A longitudinal mortise or opening is made in the sleeper to " permit of the bolt being introduced head downwards therein " until the square part projects beyond, when it is turned half " round and again raised so that the squared part may adjust " itself to the slot or opening, in which position it is prevented " from turning." The washer is then placed on the bolt, " the nut " of which presses it firmly against the foot of the rail and also " the raised projection on the base plate, while the bolt, having a " certain amount of longitudinal motion in the mortise before " mentioned, a double locking effect will be produced, inasmuch " as immediately the washer touches one side it will be subjected " to a slight inclination until it meets with the other, conse- " quently the locking is always perfect." For double-headed rails a chair made in two parts is used. The inclination of the rails may be obtained by bending the sleeper.

[Printed, 2*s*. Drawings.]

A.D. 1865, September 5.—N° 2277.

GRAND, Julien.—" Improvements in treating, working, or " manipulating cast steel for the manufacture of wheel tires, " armour plates, or other articles requiring great hardness and " tensile strength."

The invention consists, firstly, in " providing the outside of the " bar or bars, piles, lumps, fagots, or other articles of cast steel to

“ be acted upon with a coating or sheathing of wrought iron, so as
“ as much as possible to prevent the atmospheric air from coming
“ in contact with the steel, for the purpose of allowing the bars
“ or other articles to be heated to a white or welding heat, and
“ to be welded, forged, hammered, rolled, or submitted to other
“ similar operations, or to be combined with wrought iron, or
“ with blistered or other steel.”

Secondly, in “applying the said process for welding or com-
“ bining together cast or Bessemer steel and wrought iron, or
“ blistered or other steel, for the manufacture of wheel tires,
“ armour plates, rails, hoops for ordnance, axles, shafts, or
“ other articles requiring to possess great hardness and tensile
“ strength.”

[Printed, 8*d*. Drawing.]

A.D. 1865, September 21.—N° 2403.

HULME, John Bostock.—“Improvements in machinery for
“ excavating earth.”

“ The machinery is intended to be used in making railways,
“ roads, and other similar works, and it consists of a strong
“ framing mounted upon broad wheels running upon the surface
“ of the soil or clay to be excavated. At the front end of the
“ framing is jointed a pair of levers, between which a swivel
“ cutting tool is suspended; this cutting tool is made to work in
“ the arc of a circle by means of a portable steam engine attached
“ to the framing and connected to the levers above referred to by
“ suitable gearing; the steam engine is also connected by gearing
“ to the driving wheels. The swivel cutting tool carries forward
“ at every stroke a portion of the soil or clay to be excavated,
“ and deposits it in a hopper from which it is taken by an endless
“ chain of buckets working in a vertical or diagonal direction;
“ these buckets deposit the soil or clay into a shoot for delivering
“ it into waggons or trucks as heretofore customary. The
“ cutting tool in coming back is allowed to clear itself from
“ the soil or clay by segmental slots fitting on a cross stay or
“ otherwise. The buckets in rising are guided by side rods, and
“ when they arrive at the top of the drum they are successively
“ d back so as to empty their contents in the shoot above
. The levers supporting the cutting tool are sup-
other levers, one of which is counterbalanced so as
case the cutter comes against” an obstruction;

" this yielding of the weighted lever throws a clutch box or other " equivalent out of gear to disconnect the driving power."

[Printed, 10*d*. Drawing.]

A.D. 1865, September 21.—N° 2408.

NEWTON, Alfred Vincent.—(*A communication from Alexander Skelton.*)—(*Provisional protection only.*)—" Improvements in railways and in the wheels for railways." " This invention consists " in making or casting the wheels with a central flange and with " a tread at each side thereof, and in using on either side of the " track double rails or two rails set side by side, their heads " being just so far apart as to allow of the central flange of the " wheel entering between them, and thus serving to keep the " wheel from moving laterally in either direction."

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 3.—N° 2537.

NEWTON, William Edward.—(*A communication from Elias Parkman Needman.*)—" Improvements in pneumatic ways for the " transmission of letters, merchandize, and passengers." The inventor claims :—

1. " The employment as a pneumatic way for the transmission " of letters, merchandize, and passengers of a continuous viaduct " or system of tubes in which air separated from and beyond the " influence of the surrounding atmosphere is caused to circulate " by means of an air pump or its equivalent in such a manner as " to pass and repass uninterruptedly in a complete circuit."

2. The employment, in connection with this endless way, of branch tubes " for the purpose of conducting the current of air " around the stations or points where it is desired to stop the " carriages."

3. An arrangement of gates which shut the receiving stations out of the circuit of the air in the main tube and allow the stations to be opened without interrupting the current. While the gates are shut the current passes through the branch tubes.

4. The provision of a chamber at the station in which air is compressed by the advancing carriage, which compressed air acts as a buffer and brings the carriage to a halt opposite the station door.

[Printed, 1*s*. Drawings.]

A.D. 1865, October 11.—N° 2624.

PIERCE, Denison Chauncey. — "Improvements in the " permanent way of railways." Permanent way on a longitudinal sleeper, "by preference of a T shape." The inventor forms a ridge "running from end to end of the sleeper, and " which is in fact a portion of the rail." On this ridge is placed "a light cap or bridge rail," a strip of wood or other elastic material being interposed. "Other strips of wood or soft " material are also laid on either side of the central ridge of the " sleeper, and the lower flanges of the rail or cap rest on these " side strips. The rail or cap is secured by bolts passing through " its flanges and through the sleeper." The inventor also says, " In some cases, in place of using sleepers of this description, I " mount the cap on a rail which in turn is secured to the sleepers " in any convenient manner, as is described in the Specification " of a former patent granted to me, and dated the 15th of " February 1865, N° 434; but in place of securing such caps by " causing them to embrace the heads of the rails as is there " described, I employ screw bolts to hold the cap and rail " together."

[Printed 10d. Drawing.]

A.D. 1865, October 16.—N° 2669. (* *)

SKINNER, Henry.—"Improvements in apparatus for working " railway switches, points, and signals."

This invention consists of a means of preventing the risk of contradictory signals being given in working railway switches, " points, and signals, so that when any particular switch or signal " is worked, such of the other switches or signals which should not be worked until the first-named switch or signal is thrown out of gear may be locked. This is accomplished " by connecting " the lever of the switch or signal first referred to, by a link or " otherwise to a horizontal rod free to turn when the lever is " acted upon, and in securing to such rod as many notched bars
"   e switches or signals requiring to be locked at the
The notches of the bars when the first-named
d take hold of pins or projections on the lever of
r signals as are to be locked at the same time,
levers are firmly locked or held until the first-

" named lever is thrown out of gear or released, and the notched " bars thereby freed from the pins or projections."

The invention also consists of a means whereby the necessity of compensating for expansion and contraction in the rods which lead to points at a distance is avoided. Several notches are formed " in each of the notched bars which lock the point levers and " corresponding notches in the quadrants in which the switch " and signal levers work. When, owing to contraction or expansion in the point rod, a switch or signal lever cannot be moved " the usual distance in its quadrant, the ordinary spring plate on " the lever takes into one or other of the notches in the quadrant, " according to the distance the lever is moved, while the corresponding notch in the notched bar takes hold of the pin or " projection on the lever."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1865, October 20.—N° 2715.

MUSSELL, George.—(*Provisional protection only.*)—" A new " self-adjusting apparatus for railway signals, applicable also to " other purposes."

Under this head is described a system " to be employed in connection with railway signal apparatus for compensating the " elongations and contractions which occur in the wire usually " employed for transmitting the motion of the hand lever " or other apparatus.

The inventor also claims that his improvement is applicable to the working of level crossing gates " and for other similar purposes " in connection with railways." In the description of the apparatus contained in the Specification, wherein it is applied to a semaphore signal, it appears that the chain, which is joined to the communicating wire, passes up the post, over a pulley in connection with the semaphore arm and down the post again, the end being weighted for the purpose of keeping the line strained. The arm of the semaphore is also weighted sufficiently to keep the arm raised when the apparatus is free to act. " Thus when the semaphore arm is dependent and concealed within the signal post, " indicative of the line being 'clear,' " the " pulley over which " the chain passes at the top of the post is pulled downward to " its lowest position, and the signal wire and the chain is kept " strained."

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 21.—N° 2724.

FRAZER, John Durrant.—"Improvements in railway chairs."

This invention consists "in constructing railway chairs with " the horns or cheeks not opposite to each other, so that the grip " or hold upon the rail is extended to double the width of that " which is obtainable by the ordinary form of chair, covering also " the entire width of the sleeper, whilst it is at the same time " capable of being placed or removed without lifting the rail." The placing or removal is effected by turning the chair partly round and slipping it off the sleeper. When the chair is to be used at a joint, a bolt secured by a nut is passed through each horn and the web of the rail.

[Printed, 1*s*. Drawings.]

A.D. 1865, October 21.—N° 2729.

GIRARD, Louis Dominique. — "Obtaining sliding surfaces " by the interposition and circulation of a liquid or gaseous fluid " between the frictional surfaces."

"The principle on which this invention is based is the interposition at a suitable pressure of a gaseous or liquid fluid between " the surfaces sliding in contact." "For the sliding surfaces of " railways" the inventor employs "rails of a certain length, with " a compensator at about every one hundred yards to obviate " the effects of dilation or expansion without being subject to a " break of continuity, which would be the cause of loss of liquid " or gaseous fluid." This "compensator" consists of a wedge forced by a spring between the bevilled ends of two rails. "When " the temperature of the two rails is raised, they both push the " inclined face of the wedge, which is pushed back; when, on " the contrary, the rails contract, the spring acts on the wedge " and causes it to advance and fill up the space." An arrangement is provided by which the compensator is held fast while the slider is passing over it.

[Printed, 2*s*. Drawings.]

A.D. 1865, October 26.—N° 2760.

JOHNSON, James.—"Certain improvements in 'crossings' to " be employed on railways or tramways."

In order to increase the strength of the rails constituting the crossing, the inventor grooves or recesses "the flanges of one

" rail in a taper form, so as to receive the projecting flanges of " the other rail, so that when placed together, both rails will " converge to a taper point, the flanges of one entering into the " taper grooved flanges of the other, and the middle or body of " each rail being in close solid contact for a certain distance."

[Printed, 8*d*. Drawing.]

A.D. 1865, November 14.—N° 2932.

DOBIE, THOMAS.—(*Letters Patent void for want of Final Specification.*)—" Improvements in the permanent way of railways."

"The chair is constructed in two parts, one part forming the " bottom and one jaw, with a projection for the other jaw to be " fixed to it by pin, bolt, cotter, or other similar means, in such " manner as to become an abutment to the loose jaw." The rail is supported by the top flange resting upon the two jaws, so that when the rail is turned it is not found to be damaged as heretofore by contact with the chair.

[Printed, 4*d*. No Drawings.]

A.D. 1865, November 24.—N° 3024.

NEWTON, ALFRED VINCENT.—(*A communication from John Mc Murtry*).—" Improvements in the construction of railways " and in spikes for securing the rails in position."

" In one form the chair is made in two parts which clip the " rail and are secured together by screw bolts passed through the " chair and rail, and rivetted at the screwed end. One half the " chair is made stronger than the other, and it is carried up to a " level with the rail for the purpose of sustaining the passing " wheels. This chair serves to support the ends of the rails so " effectually as to prevent the excessive wear usual at their junction." Instead of making the chair in two parts, a fish plate may be substituted for one of the parts. A continuous rail supported on a continuous chair constructed in two parts, the whole bolted together, is described. Also a modification of this last plan, wherein the chair is made in one piece instead of two. There is also claimed an improvement in spikes for securing the chairs to the sleepers. " The pointed ends are barbed, so that " they shall take a firm hold in the timber into which they are " driven. When barbed only on the inner face the spike will " curl outwards in the wood, and take a very firm hold therein."

[Printed, 1*s*. Drawing.]

A.D. 1865. December 1.—No 3084.

DODDS, Thomas Weatherburn.—"Improvements in the "manufacture and treatment of railway bars, tyres, and axles, "also in the construction of furnaces, machinery, and appa-"ratus connected therewith." Under this invention the inventor claims "the manufacture of railway bars, tyres, and axles so "as to produce the steeling and hardening of the wearing sur-"faces by the combined use of the cementing process" and condensing rolls or hammering. Furnaces for cementing bars and axles, and also for cementing tyres, are described, as well as furnaces heated by the waste heat of coke ovens. The rolls are so contrived as only to condense and harden the cemented or steeled surfaces by the action of a vertical roll, "the arrangement "of the remaining rolls being adapted for holding and supporting "the bar under operation in such a manner as to secure the bar "against alteration in its sectional form by the condensing action "of the upper roll."

[Printed, 1s. 4d. Drawings.]

A.D. 1865. December 6.—No 3131.

TAYLOR, Joseph.—(*Provisional protection only.*)—"Certain "improvements in the manufacture of railway chairs, and in the "manner of securing rails thereto."

"The chair is so made that the rail being placed within it fits "against one side of the chair quite closely." Between the other side of the chair and the rail is placed a "cheek plate," which just fills up the space between the two heads of the rail. Between this cheek plate again and the chair is placed a tapped plate, and a screw passing through the side of the chair forces the tapped plate against the cheek plate, and so holds the rail securely. Joints of rails are to be secured in a similar manner, but a larger tapped plate is then to be used. "The cheek plate is also "furnished with two teeth or cogs, square or round, which are "to fit into corresponding holes punched out of the ends of the "rails."

[Printed, 4d. No Drawings.]

A.D. 1865, December 6.—No 3138.

DAWS, George.—"A new or improved method of and apparatus for locking gates, turnstiles, and stiles on railway crossings."

This invention essentially consists "in causing the passing of "a train to act on certain cranks and levers," whereby the gates or turnstiles on both sides of the line will be locked in such a manner as to prevent persons entering, but not to prevent their leaving the line.

[Printed, 10*d.* Drawing.]

A.D. 1865, December 9.—N° 3168.

BONNEVILLE, HENRI ADRIEN.—(*A communication from Achille Philippe, Cyprien Legrand.*)—"Improvements in the "permanent way of railroads." "This invention consists in "forming the sleepers and chairs of railway lines of one single "piece or bar of iron or steel bent in such a way as to form "sleeper and chair, or bearing alone. This is done by bending "the bar so as to embrace the rail more or less closely. Under "the double curve which forms the chair may be placed a pad "or slab of wood, india-rubber, or other elastic or semi-elastic "material, or an iron rod or bar may be placed under the chair "and bolted on either side of the same to give it greater strength. "Ribbed or angle iron may be employed for greater strength and "lightness, or an iron or steel bar may be enclosed in the piece "of cast iron from which the whole is formed, which bar would "take the form of and greatly strengthen the chair."

[Printed, 8*d.* Drawing.]

A.D. 1865, December 9.—N° 3173.

DOULL, ALEXANDER.—"Improvements in constructing atmo- "spheric railways and carriages, and in working the same parts "of which are applicable to exhausting and condensing air for "other purposes."

The carriages are propelled through tunnels or tubes about 7 or 8 ft. in diameter by means of atmospheric pressure. A carriage provided with a diaphragm which fits the interior of the tube is placed at each end of the train. The system may be used for ascending mountain inclines, and, in addition to the machinery for exhausting the air, an accumulator is provided. Supposing the train started, "if the vacuum was very high the speed would "be very rapid for some considerable distance, until the air by "the progress of the train became condensed faster than the "engine could extract it. The air is then allowed to rush into

" the accumulator from the tube, which greatly assists the engine " and accelerates the progress of the train to the summit. . . . . . " When the descending train passes into the portion of the tube on " the opposite side of the mountain a valve is shut behind it, so " that the train will form a vacuum or partial vacuum behind it. " The progress will therefore be very slow; the air in the accu- " mulator . . . . . is then permitted to rush into the vacuum, not " in large quantities, but just sufficient to allow the descending " train to move at a safe speed. When the supply of air from the " accumulator . . . . . . is exhausted, and a partial vacuum thus " formed in the accumulator, it is shut in order to preserve this " vacuum, and air is then admitted from the front of the train " to the rear through valves in the diaphragms, and the quantity " of air which is thus allowed to pass from the plenum in front " of the train to the partial vacuum behind it governs the speed " of the train." The tube may be made of almost any materials but in some cases " it is composed of malleable iron ribs rolled " into an H shape," bent to the required shape, placed about 3 feet apart, with cross ties, and the spaces between filled in with any suitable material. The method of construction of a tunnel of cast iron under a river or estuary is also described, as is also a kind of air lock or chamber, through which men and materials may be introduced into the tunnel without lowering the pressure therein. The trucks for conveying materials are so constructed that one may be drawn over the other if desired. The air is exhausted from the tube by revolving discs, each carrying four feathering fan blades, and also by fans of other description. The carriages run on a single central rail, and are further guided by friction rollers.

[Printed, 2*s*. Drawings.]

A.D. 1865, December 11.—N° 3199.

LAKE, WILLIAM ROBERT. — (*A communication from Henry Warren Warner.*) — " Improvements in the permanent way of " railways."

This improvement relates to a " method of supporting the " ends of railway rails, whereby the space between the said ends " is bridged or filled up, and a continuous bearing surface is " afforded to the wheels in passing over the joints." For this purpose a kind of chair is used, on the bed of which are placed the ends of the two rails. The ends of the rails are bevelled, and between them comes a wedge-shaped upright, which forms part of the chair. The wedge-shaped upright also extends both ways on one side of the rail, and bolts pass through it and the webs of the rails. Slots are formed for the bolts, to allow for expansion.

[Printed, 10*d.* Drawing.]

A.D. 1865, December 13.—N° 3224.

SANDERSON, John.—" Improvements in the manufacture of " railway bars."

The invention has relation to the manufacture of compound rails of steel and iron. A suitably sized bloom is heated to a white heat, cleared of scale, and placed as quickly as possible in a cast-iron mould, the inside of which has been previously smoked to prevent adhesion. A false side to the mould is then wedged up to the bloom, by which spaces are only left between the bloom and mould at the two sides at right angles to the false side. Molten steel is then poured in, and the resulting compound ingot is hammered or rolled into a rail.

[Printed, 6*d.* Drawing.]

A.D. 1865, December 23.—N° 3322.

DUFRENÉ, Hector Auguste.—(*A communication from Gerard Christiaan Heyning.*)—" Improvements in the permanent way and " wheels of railways."

" A great defect has existed up to the present time in the con-" struction of railways, and in the application of tramways for " horses, consisting in the necessity of giving a radius of a con-" siderable length to the curves to be run over. On account of " the wheels of an equal diameter being fixed to the axle they " have a tendency only to run in a straight line."

The inventor therefore proposes to mitigate the evil complained of "by constructing the wheels on their circumference with two, " three, or more different diameters, the largest being turned " towards the axle, which diameters are calculated in proportion " to the radii of the curves to be run over ;" and also " by placing " the rails in place where the curves occur, so that each circum-" ference of the wheel can be used at will, that is to say, according " to the curve."

[Printed, 10*d.* Drawing.]

A.D. 1865, December 23.—N° 3332.

WEBB, Francis William.—"Improvements in the construc-
"tion and manufacture of steel crossings for railways, and the
"moulds for casting the same, all or part of which said improve-
"ments in moulds are applicable to casting other articles."

The first part of this invention consists in forming steel crossings "so that the junction of one rail with the point or crossing
"will overlap its junction with the other rail to about the extent
"of half the length of a 'fish-plate' so that a 'fish plate' will
"only be required on one side as the overlapping rail on the other
"side will answer the purpose of a 'fish-plate.'" In making crossings of Bessemer or other steel, the inventor casts them
"with the point end deeper than required when finished, and
"then forging and reducing the casting to its proper depth,
"thereby condensing and consolidating the metal." The inventor also makes steel crossings with the rails attached by placing the ends of the latter, when heated to a welding heat, in the mould and pouring the melted steel around them. Thus the rails and the crossing become firmly united. An improvement in moulds, the structure of which allows for contraction, is also described.

[Printed, 10*d*. Drawing.]

1866.

A.D. 1866, January 1.—N° 6.

BARNINGHAM, William.—"Improvements in machinery and
"apparatus for charging blast and other furnaces."

The inventor claims "the application of a tram or railway placed
"above and supported by blast or other furnaces for the purpose
"of supplying them with ore, fuel and other materials in ordinary
"railway wagons;" and also "the application of inclined rails for
"elevating the ordinary railway wagons loaded with ore, fuel,
"and other materials from the level of a line of railway to the
"level of the rails over the furnaces and for the descent of the
"empty wagons."

[Printed, 10*d*. Drawing.]

A.D. 1866, January 2.—N° 12.

BRUFF, Peter Schuyler.—"Improvements in fastenings for "the permanent way of railways."

In order to secure contractors' and bridge rails to the sleepers, in a cheap and effectual manner, the inventor employs "a clip, by "preference, made of cast iron or wrought iron, having a lip which "presses upon the flange of the rail, a shoulder which abuts "against its edge, with or without projections on the under side, "which bed themselves into the sleepers, and a hole or holes "through which a screw or flanged bolt or bolts passes or pass to "hold it down, and thereby secure the rail firmly in its place."

Another part of the invention consists in forming jagged bolts "for holding rails or chairs, with 'jags' or serrations formed in "a helical direction upon their surfaces, ... whereby the removal of the bolt from the sleeper can be effected without "destroying the fibre of the wood."

[Printed, 10*d*. Drawing.]

A.D. 1866, January 6.—N° 50.

DE MESNIL, Baron Oscar.—(*Provisional protection only.*)—"Improvements in towing boats on rivers or canals, a part of "which improvements is also applicable to the traction of vehicles "on rail or tramways, or common roads."

The invention consists in laying down a wire cable along the middle or side of the road and passing the cable round a Fowler clip drum on the vehicle. As the drum rotates the carriage is consequently propelled. The rest of the Specification applies this principle to towing boats.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 10.—N° 78. (* *)

IRELAND, Jonathan, and DAVIES, Samuel.—"An im"proved turntable and weighing machine combined."

Within the circumference which encloses the turntable, and below the latter, are placed three triangles or triangular levers, resting at their basis upon six swing centres, and being shackled at their apices to a triangular plate, suspended from a long horizontal "transfer" lever, connected by a rod to the shorter end of a steelyard, furnished with suitable appendages and mounted some distance from the turntable. When not in use for weighing purposes the turntable rests upon antrifriction pulleys supported in stands below it, but when it is requisite to weigh the carriage or other body which may be on the turntable, certain "relieving " apparatus," which at other times lowers the fulcrum of the steelyard and the parts connected with the latter, now raises such fulcrum and therewith the triangular levers, and causes the latter, by means of "six stool centres" carried by them, to raise the turntable from the antrifriction pulleys, thus in fact converting the apparatus into a platform weighing machine, the parts being restored into their original position after the operation of weighing by again using the relieving apparatus. The latter consists of a weighted lever, capable of being turned into different positions, and furnished with a pinion which acts upon a rack connected with that part of the apparatus which supports the fulcrum of the steelyard.

The patentees state that either three triangular-shaped levers, with six swing centres, and six stool centres, or a great number of each may be used.

[Printed, 10*d*. Drawing.]

A.D. 1866, January 10.—N° 82.

CLUTTON, JOHN.—(*A communication from Theodore Despian.*) —" Improvements in wedges, keys, or quoins for securing the " rails of railways in their chairs."

In order to prevent the wedge as at present used from being damaged by the blows of the hammer in driving it home, the inventor secures the " compressed wooden wedges in iron frames " provided with a head which is intended to receive the blows of " the hammer." Various methods of doing this are described in the Specification.

[Printed, 6*d*. Drawing.]

A.D. 1866, January 20.—N° 196.

THOMAS, WILLIAM, the younger.—(*Provisional protection only.*) —" Improvements in machinery for making moulds for casting " metals."

In this machine, "the mould box rests upon a horizontal table " made in halves, the said halves being capable of separating " from each other to permit of the passage of the pattern into

" the mould box. . . . . The pattern to be moulded is fixed to " a vertical rod or tube moved up and down by a lever. When " a tube is employed its lower ends work steam-tight in a cylinder " to which steam is admitted. The steam from the cylinder " passes by the said tube to the pattern," which the inventor prefers to make hollow, "and keeps the said pattern warm." A roller, carried by a reciprocating bar, traverses the open top of the mould box and presses the sand therein. "After the roller " has moved across the box and has made its return motion, a " rammer having projections or teeth on its under side descends " and rams the sand in the box. . . . . Scrapers may be attached " to the shaft of the roller for clearing away the sand from the " edges of the box."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 26.—N° 260.

BARLOW, WILLIAM HENRY.—"Improvements in the manu" facture of railway bars."

" In constructing railway bars partly of steel and partly of iron, " the steel is first rolled or formed with a flange or flanges and " web corresponding to the section of rail desired to be made, " whether for a double-headed rail of the ordinary construction " or for a contractor's rail. The channels or hollow spaces on " each side of the web which joins the two heads or flanges of a " double-headed rail, or which joins the head and foot of a con" tractor's rail, are to have bars of iron introduced, and the rail " is then to be finished by rolling to produce the length and " section desired."

[Printed, 8*d*. Drawing.]

A.D. 1866, January 30.—N° 287.

BERRIE, JOHN.—"Certain improvements in the construction " of railways."

The object of this invention is to economise space, and "the " improvement consists in constructing railways with an upper " and lower permanent way, the lower one being on the ground " as now employed, and which will be best adapted for 'goods " 'trains' and such heavy traffic, the upper or passenger lines " being constructed above the lower lines. . . . . When the " lines thus arranged are carried through from end to end each

" will have its traffic; but when the principle is only applied at " termini both goods and passenger traffic is conducted on the " lower main line as at present, and access to the upper line for " passenger trains at the termini is obtained by means of a siding " made on a gradual incline from the lower to the upper line."

[Printed, 10*d.* Drawing.]

A.D. 1866, February 7.—N° 376.

MAXWELL, Joseph Alexander.—" Improvements in pneu- " matic railways."

The improvements " relate to a tunnel or covered way of any " dimension in which rails are laid for the running of carriages " impelled by a stationary engine, and the invention consists in " the application thereto of a guide carriage having a sail or piston " filling the cross section of the tunnel or covered way fixed to " it, said sail or piston being under the control of the driver in " charge, and furnished with an air valve and brake. The car- " riage or train of carriages is brought to its destination by a " withdrawing fan producing an artificial current of air in the " tunnel or covered way."

[Printed, 4*d.* No Drawings.]

A.D. 1866, February 8.—N° 385.

ATWATER, John Bowman. — " An improved apparatus for " raising or forcing water by the aid of steam and air, for sup- " plying locomotive tenders, and for other purposes."

The inventor thus describes his invention :—" I take a strong " and capacious vessel and partially immerse it in the water of " the well or tank from which the water is to be taken, and " attach a pipe to be connected to a boiler to admit steam at will " through two branches near the top of the vessel. I provide " a self-acting valve opening upward through the bottom of the " vessel, and a discharge pipe leading from near the bottom of " the vessel to the place where the water is to be delivered. The " vessel is divided above the middle by a horizontal diaphragm " provided with a valve opening downwards. The two branches " of steam pipe are connected to the vessel, the one at the top " and the other immediately beneath the valve partition. Both " are controlled by cocks. In operating the invention the steam " is admitted suddenly through the upper branch of the pipe,

" and drives the air down before it through the valved partition. " The steam is then shut off from the upper chamber and " admitted into the lower, the incoming steam being directed " upward against the valve in the partition so as to insure its " prompt closing. Steam being lighter than air accumulates in " the top of the lower chamber, pressing down upon a stratum " of air, which air separates it from the water, but transmits the " pressure of the steam thereto, forcing it to be delivered through " a pipe with great rapidity."

[Printed, 8*d*. Drawing.]

A.D. 1866, February 13.—N° 453.

KELLY, Samuel William.—(*Provisional protection only.*)— " Improvements in the manufacture of rails, bars, and girders." The inventor proposes to roll rails, bars and girders with greater economy and perfection by employing in his pile " tops and bottoms " with shoulders all in one, and not having separate shoulder pieces such as those at present usually employed.

[Printed, 6*d*. Drawing.]

A.D. 1866, February 24.—N° 575.

HASELTINE, George.—(*A communication from Asa Bigelow, junior, and Swain Winkley.*)—" Improvements in the construction " of railways."

The line of rails is supported on sheets of corrugated iron, the sections of which are connected by wrought-iron ties. The ridges of the corrugations are arranged transversely to the track and the " edges of the outside corrugations are connected by a cap piece " extending across them, which serves as a tie and prevents the " spreading or flattening of the " corrugations. " The cap piece " is formed with lips that are turned up to grasp the foot of the " rail on each side, or it may be clamped and keyed to the rail as " may be preferred, or otherwise secured by bolts or rivets."

[Printed, 8*d*. Drawing.]

A.D. 1866, March 1.—N° 631.

LAKE, William Robert. — (*A communication from Lewis Alexander Osborn.*)—" An improved spike " constructed in such a manner " that each half or prong thereof on being driven into " wood will diverge or turn outward in a plane parallel with the

" split in the spike. . . . . The ends of the two halves or prongs
" of the spike are pointed like a wedge or chisel, the edges being
" bevilled or chamferred in opposite directions. Each prong
" therefore cuts its own way as the spike is driven into the wood,
" and from the direction in which the points of the said prongs
" are chamferred they will diverge from each other." This spike
" can also be drawn out of the wood and used again if desired."

[Printed, 8*d*. Drawing.]

A.D. 1866, March 2.—N° 635.

ROGERS, WILLIAM.—(*Provisional protection only.*)—" Improvements in the construction of the permanent way of railways."

" By this invention firstly, it is proposed to use transverse or
" cross timber sleepers of rough balks of timber of any convenient section, which after being hewn or sawn or when being
" hewn or sawn are shaped with chamfered or bevelled edges
" where required." The chair is so made "that when attached
" to the improved sleeper it will be retained thereon with greater
" security by means of flanges at a certain angle with the bed of
" the chair and by the form of the two ends of the transverse
" timber sleeper."

[Printed, 6*d*. Drawing.]

A.D. 1866, March 7.—N° 698.

THOMSON, WILLIAM.—" Improvements in the manufacture of
" railway crossings."

The patentee claims,—

1. The production of " railway crossings from steel castings by
" rolling or hammering the same, and then planing or cutting
" away the metal to form the grooves for the flanges of the
" wheels."

2. " Splitting or dividing the end or ends of the hammered or
" rolled steel casting to form the rails or ends to be attached to
" the ordinary rails."

3. The production of a " railway crossing from a plate or slab
" of hammered or rolled iron by splitting the ends of the slab
" and planing or cutting away the metal to form the grooves for
" the flanges of the wheels."

[Printed, 8*d*. Drawing.]

A.D. 1866, March 19.—N° 814.

CROLL, Alexander Angus.—"Improvements in arranging "conduits or channels for the reception of gas, water, and other "mains, tubes or pipes, and telegraphic wires, also for the con-"veying away of smoke or noxious vapours from buildings, and "for the ventilation of buildings and other places." In order to obviate the inconveniences arising from placing telegraph wires, pneumatic despatch tubes, &c. in subways under the streets, the inventor proposes to place them in a tube supported upon a row or rows of columns, above the footway.

The columns and tube are also to be subjected to ornamentation and will be further useful in supporting the street lamps, &c.

[Printed, 2*s.* 10*d.* Drawings.]

A.D. 1866, March 22.—N° 851.

NEWTON, Henry Edward.—(*A communication from Theophile Joseph Finet.*)—(*Provisional protection only.*)—"Improvements "in apparatus for propelling railway carriages upon inclines." This invention consists in employing a central rail, in propelling trains upon inclines, instead of the ordinary traction rope.

"On this central rail two horizontal wheels or rollers are caused "to bite with greater or less adherence according to the steepness "of the incline, and on being caused to rotate will draw the train "up the incline." The rotation is caused by means of "endless "ropes or cables passing round driving pullies (actuated by any "suitable motive power) at each end of the incline. The ends "of the rope severally pass round horizontal pullies set under-"neath the body of the carriage." The wheels which compress the rail are mounted on the shafts of these pullies.

[Printed, 4*d.* No Drawings.]

A.D. 1866, March 24.—N° 877. (* *)

JOHNSTON, Thomas, and RENNIE, Thomas Wilson.—"Improvements in arranging or combining the wheels and trams "or ways for carriages on common roads."

According to this invention "one of the trams or rails of a line "of tramway on a common road is formed with a narrow groove "towards one edge, whilst the other part of the rail or tram is "flat, and is to receive the flat or plain part of the tyre of each

" wheel on one side of the tram carriages which are to run on the " line. The flange of each wheel on that side of the tramway " carriages enters the narrow groove in the rail or tram, and the " carriages are thereby guided along the line. The other rail of " the line is flat, and such is the case in respect to the surface of " the tyres of the wheels on the other side of the tram carriages " which run thereon, such wheels having no flanges. By this " arrangement or combination the tram carriages are guided and " retained by only one rail or tram," the patentee stating that the result of the arrangement is that " there is no possibility of the " wheels jamming, as in cases where both rails are grooved and " the grooves very narrow." He also states that carriages with ordinary wheels, or wheels without flanges, may run with freedom on the lines, and also cross the lines without shock, owing to the narrowness of the groove in the grooved rail or tram.

[Printed, 8*d*. Drawing.]

A.D. 1866, April 13.—N° 1051.

FOMBUENA, Valentin Silvestre.—" Improvements in the " construction of sleepers or supports for the rails of railways and " for other purposes."

By the present invention the rails are secured to the rolled iron sleepers by clips or projections, rivetted to or punched out of the sleeper. These clips may be separate from the sleeper, in which case they will constitute a chair. The mere act of squaring the rail into position secures it against the clips or chair.

[Printed, 10*d*. Drawing.]

A.D. 1866, April 20.—N° 1119. (* *)

NEWTON, William Edward.—(*A communication from Auguste Louis Risbourg.*)—(*Provisional protection only.*)—" Improvements " in working the switches or points upon railways."

The switches are provided with a self-acting apparatus acted upon by the train in passing for shifting them laterally, which apparatus consists of " a transverse bar or rod bolted at each end " to the switches. Upon this bar or rod are collars attached to " chains situate at opposite sides of the rod, and passing over a " series of pullies, which cause these chains to pull the collars, " and consequently the rod, attached to the points in opposite " directions. These chains are connected by traction rods with

" rocking levers, which on being depressed by a shoe or pad or a " bowle on the extremity of a rod projecting downwards from the " locomotive or any of the carriages of the train will put tension " upon the chains, and by that means shift the points in the " required direction. Upon a train approaching the points it " will act upon the first rocking lever in order to shift the points " as required, and when the train has proceeded some little distance, it will come in contact with and act upon a rocking lever " similar to the first, by which the points will be caused to resume " their former position. The rocking levers which actuate the " points are connected together by means of a cord for the purpose " of giving notice when two trains are close upon one another; " in this case the trains by acting upon both the rocking levers " will put more tension upon and draw down the cord, which " will pull or release a catch, and thus bring into action any well " known audible or visible signal apparatus, which has been " retained in a quiescent position by the catch."

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 26.—N° 1175.

CURTIS, John.—(*Provisional protection only.*)—" Improvements " in draining and consolidating cuttings, embankments, and " other parts of railways." The inventor cuts drains of the requisite depth, and places drain pipes therein. The drains are then filled "to nearly the surface with chalk, flint stones, cinders, " or other like substances." Thus " the water is conveyed away, " and all danger of accident obviated."

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 5.—N° 1282.

DAVIES, George.—(*A communication from Jean Baptiste Java Mignon and Stanislas Henri Rouart.*) — " Improved apparatu " for exhausting and compressing air, applicable to the trans-" mission of despatches and other objects through tubes, and to " raising water."

The carriage used in this system consists of "a light box " closed at its forward end with a lid in any suitable manner, its " exterior being of smaller diameter than the interior of the " atmospheric tube. The rear end of the box (or that which has " to bear the atmospheric pressure) has attached to it a cup-

" shaped piece of leather forming part of a sphere of larger
" diameter than the inside of the atmospheric tube, and working
" air-tight against the interior of the same. The forward end
" of the box is provided with small springs, which keep it steady
" in the tube."

The atmospheric pressure is obtained by compressing or exhausting air from receivers by means of a falling column of water; or by causing "the reservoirs to move up and down in " the water, like the bell of a gasometer."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1866, May 5.—N° 1287.

BOOTH, Jonathan Law.—" Improvements in rails for railways, " and in the mode of and apparatus for producing the same."

This invention consists, " first, in the combination of a steel cap " with an iron body when the same is shrunk on; second, in the " combination of rollers in a suitable machine for rolling the cap " on the body; third, in the employment of a short section or " sections at the end of the iron body, in shrinking the cap on " to compensate for the contraction of said cap in shrinkage. . . . " As the cap shrinks it contracts from off the short section or " sections placed at the ends of the rail and covers simply the " rail itself. Were the cap to be applied hot simply but the " length of the rail, the contraction would shorten it, so that " the rail would have to be cut when cool, and, on the other " hand, were the cap made to overlap without the use of the " section or sections, it would shrink or be rolled out of form, " and produce a bad contact joint."

[Printed, 8*d*. Drawing.]

A.D. 1866, May 7.—N° 1303. (* *)

BROWN, James.—(*Provisional protection only.*)—" Improvements in machinery or apparatus for actuating railway signals " and points."

This apparatus consists of a " series of vertical hand levers, " say ten in number, set on pivots in a framework supported
the ground by standards carrying the signal box; these
escend to bell-crank levers actuating horizontal sliding
in bearings close to the ground, or in any convenient
Across these rods, three rods are arranged in bear-

" ings; these rods carry hinged vertical pins dropping into holes " bored in the series of ten or more lower rods; these pins are " so arranged as to actuate various series of the several rods, in " order to effect unison of signals and corresponding points."

The inventor states that the " chief novelty " of " this invention " consists " in the arrangement of "the sliding rods and the " oscillating rods above them in connection with the hinged pins " dropping in the holes of the sliding rods or bell-cranks, whereby " a locking and unlocking action is communicated mutually " among the system of signals and points effecting unison of " action."

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 9.—N° 1328.

GEDGE, William Edward.—(*A communication from Charles Nicoli.*)—(*Provisional protection only.*)—" An improved method " of and apparatus for preserving the banks of rivers and water- " courses or other embankments from corrosion or wasting." The patentee claims a method of preserving embankments from corrosion or wasting by water, by means of a network of bricks or blocks of stone, tied together by iron rings. " Willows or " other bushes may be planted in the interstices between the " bricks, and form an additional support to the network, and as " their roots eventually spread and tie the bank together, if the " network were then removed the bank would be safe from " corrosion."

[Printed, 6*d*. Drawing.]

A.D. 1866, May 19.—N° 1421.

VINCENT, George Jackson. — " An improved method of " securing or holding flat-bottomed or bridge rails."

To carry this invention into effect, a hole is bored through the sleeper, and a bolt passed through from the under side. Between the head of the bolt and the sleeper is placed a fang plate or washer. The clip to hold the rail " is now placed upon the bolt " and allowed to fall into its proper position upon the flange of " the rail. A circular washer of any ordinary description is then " placed thereon, and upon this a square nut of suitable strength " is screwed down to its proper bearings." Sometimes the fang plate may be tapped so as to form the nut of the bolt, which in that case will be passed through the sleeper from above. Sometimes, also, the fang plate may be dispensed with, the under side of the clip being fitted with fangs, and a wood screw used instead of a bolt and nut.

[Printed, 10*d*. Drawing.]

A.D. 1866, May 25.—N° 1458.

COOKE, JOHN.—(*Provisional protection only.*)—" Improvements " in the rails or permanent way of railways, and in the means " of guiding and retaining locomotives and carriages thereon, " for obtaining additional safety in travelling." This invention " relates to improved arrangements of the rails and surfaces upon " which the wheels of the locomotives and carriages travel, the " construction of the rails forming a tramway with an inside " vertical rib or flange for guiding the wheels, which are formed " without any projecting rim or flange, guide wheels or surfaces " being affixed to the under side of the locomotive or carriages to " act against the inner sides or surfaces of the rails or tram" ways."

[Printed, 6*d*. Drawing.]

A.D. 1866, May 28.—N° 1481.

SPENCER, GEORGE.—" Improvements in supporting the rails " of railways."

The inventor carries out his object by means of " girders of " wood or iron placed under the metals at the joints, and on which " girders the rail ends rest." Sometimes suitable supports are fixed to the centre of such girders, " so that the rails bear only " on such support for a few inches at their ends. " Also an " additional cross sleeper or other support under the joints of the " rails " is sometimes used, and on this is placed " a support for " the rail ends, so that it shall have vertical and lateral support." The fish-joint is also used.

[Printed, 6*d*. Drawing.]

A.D. 1866, May 31.—N° 1526.

WTON, WILLIAM EDWARD.—(*A communication from Charles pson Harvey.*)—" Improvements in railways and in propelling riages and vessels by means of ropes or chains."

The rope by which the train is propelled runs along the centre of the track, and is supported on guides fitted with friction rollers. Attached to the rope at regular intervals, are "bulbs or "heads, or rounded projections," which are intended to receive the friction and protect the rope. These projections are surrounded by outer adjustable rings to receive friction. A pendulous clutch, in connection with a suitable spring apparatus for taking up the shock, is attached to the carriage. In some case two ropes, travelling at different speeds, may be provided, that the train may be able to run fast or slow as desired. "Another part "of the invention relates to an improvement in draw bridges for "street crossings of that kind of elevated railways in which the "propelling power is transmitted to a car or other vehicle "through a moving rope, cable, or chain." The bridge is placed on hollow posts through which the shafts for opening the bridge and the cables for propelling the cars are passed. Both sections of the bridge may be opened at the same time by means of the same shaft.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1866, June 6.—N° 1567.

GREAVES, HUGH.—"Improvements in the construction of "parts of railways."

1. "Constructing cast-iron sleepers to suit loose chairs, so that "in the event of either the chair part or the sleeper part being "broken the part not broken may still be utilized, and the "more effectually to distribute the weight of the passing loads "over the sleepers, making them with hollows or recesses to "fit the chairs, so as to take the strain of the bolts or fastenings, "and preserve the gauge, and to prevent the piece or pieces of "wood on which the chair rests from spreading or expanding "under the loads; likewise in providing two extra wood bearing "surfaces for the rail in addition to the central one or loose "chair, ... in securing the rail in the chair by an iron key or "wood and iron combined, the seats on which the rail rests being "elevated or raised above the top of the sleeper, so as to enable "the sleeper to be more effectually covered with ballast."

2. "Constructing cast-iron sleepers with one or more half jaws "formed with the sleeper, and binding or jamming the rails up to "or against the same by means of a cotter passing through the tie

" bar connecting the two rails, and in the case of intermediate " sleepers using a short bar equivalent to a part of a tie bar for " enabling the rail to be similarly secured."

3. "The use of an iron sleeper in connection with one or more short wood girders, to absorb the blow of the wheels, a loose chair " resting on such girder or girders, and one or both of the bolts " securing the chair to the sleeper, likewise securing the tie bar. . . . . if the holes in the chairs are too large for the bolts" they are filled with hard wood or metal collars, "so as to enable them " to fit the bolts tightly."

4. " The use of an overhanging jib or platform carrying rails " corresponding in gauge with that of the lines in connection " with which it is to be used and arranged, so that by means of " a transverse line of rails it may be brought opposite to any one " of such lines, and when one or more carriage or carriages is or " are passed on to it it may be placed at an angle so as to tip the " carriage or carriages and discharge its or their contents."

Some of these improvements are improvements on the inventors previous patent, No, 1152, A.D. 1856.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1866, June 8.—N° 1577.

ARMSTRONG, Joseph.—(*Provisional protection only*.)—"Improvements in the manufacture of crossings for the permanent " way of railways."

This relates to improvements on the former patent granted to the inventor, No. 1398, A.D. 1865. The improvements " consist " in forming the ends of the point and of the wing or side rails " where they join on to the ordinary rails in to separate rails so " as to afford facility for fishing them to the rails. This may be " effected by suitably formed dies, ... or the ends of the point " and wing or side rails where they join on to the ordinary rails " may be left solid and of a suitable form, to be afterwards cut " up by a saw or other suitable means and then opened out by " wedges or otherwise, or a wedge-formed piece may be cut out of " the ends of the point and wing or side rails so as to form them " into separate rails. The crossings may be of the form shown " and described in the Specification of another patent granted to" the inventor, namely, No. 2530, A.D. 1856.

[Printed, 4*d*. No Drawings.]

A.D. 1866, June 23.—N° 1676.

DEAKIN, Thomas.—(*Provisional protection only.*)—" Improve-" ments in overhead railways, and in machinery for moving, turn-" ing, and weighing goods, wagons, carriages, and engines, for " railway and other purposes."

The object of these improvements in overhead railways is to dispense with turntables " by using a compound carriage, " namely two carriages, one supporting and carrying with it the " other carriage. One is the longitudinal carriage, working along " the whole length of the main line, and the other is the trans-" verse carriage, to which the weight is suspended and by which " it is carried along to any of the intersections (right or left) or " cross roads, and then freely run on to it without turning, the " traverser being always in position for any line."

By one arrangement the main lines may be placed above and the cross roads underneath, to avoid the necessity of cutting gaps in the main line of rails. The addition of a suspended cradle to the compound carriage system, affords a means of transferring rolling stock without interfering with the permanent way. An ordinary weighing machine lever may also be introduced for obvious purposes. Locomotives may use their own steam, through a flexible pipe and small engine, for effecting their transfer.

[Printed, 4*d.* No Drawings.]

A.D. 1866, June 23.—N° 1681. (* *)

HILL, Henry.—" Improvements in the working, governing, or " locking of railway signals and switches."

The patentee arranges " levers in a frame in such manner as to " admit of certain of them having two different movements, a " forward and a backward movement." He provides such " levers " with slotted rods, or with chains or cams which connect them " with two or more signals or switches so that each movement of " the lever shall affect one signal or switch without altering the " position of the other signal or switch."

2. The patentee also makes the levers pass through plates in which are openings with slots, and " arranged in such wise that " one plate generally is acted upon by more than one lever so " as to be capable of producing more than one combination, " whereby if any one of the levers is moved all other levers " actuating the signals or switches which it would be dangerous

"to move at the same time will be locked or fastened, and all "those levers actuating signals or switches, the movement of "which would not be dangerous, will be liberated."

The patentee arranges his apparatus in such manner that the movement of any lever causes the locking plate or plates to slide "endways or otherwise so that the stops which are formed by the "slots cut in the plate or plates shall be presented to or moved "across the edge or edges of the other levers actuating signals or "switches which it would be dangerous to move at the same "time." He cuts "these slots in such form or shape that no "signals can be moved until the corresponding points or switches "are in proper position, and such signals when lowered or placed "at 'all right' will fasten the corresponding points or switches so "that they cannot be altered until the signals are returned to "'danger.'"

[Printed, [illegible] Drawings.]

A.D. 1866, June 26.—Nº 1699.

HOLLISS, CHARLES PEACHEY.—"Improved modes of applying "packing of elastic or flexible materials to axletrees, springs, and "bearings of railway and other carriages, to rails, chairs, and "sleepers, and to frames of machines, for isolating them from "contact and preventing noise." This invention relates to improved modes of applying elastic packing to permanent way and other things.

The chair is hollowed out to admit of the packing, which may be of india-rubber, cork, felt, or other elastic material, being placed between the rail and the chair. The bolts are surrounded "with "a ring packing, and the borings made larger than the bolts to "admit of its application." The chair also rests on a bed of packing. In fixing the rail in the chair it is preferred to use "a set screw with an iron plate to prevent its shifting or dragging "the packing out of position in the act of fixing, and where "wedges are used" it is preferred to use "two reversed wedges "and an intervening plate of iron next the packing for the inner "wedge to work against."

[Printed, 1s. 4d. Drawings.]

A.D. 1866, June 27.—Nº 1717.

WILLIAM EDWARD.—(*A communication from Henry ill.*)—"Improvements in apparatus for raising and

" forcing water and other liquids, applicable to the ejection of " bilge water from vessels, the filling of the tanks of locomotive " tenders, and for other purposes."

The apparatus consists of a water crane communicating with the water tank or reservoir. Near the bottom of the crane is an injection pipe through which steam is allowed to flow from the locomotive. This jet of steam induces and forces a current of water up the crane and into the tender. A suitable valve is fitted to the crane so that no water is allowed to remain in the crane, thus the evil effects of frost are provided against.

[Printed, 8*d*. Drawing.]

A.D. 1866, June 29.—N° 1732. (* *)

THOMSON, William.—(*Provisional protection only.*)—" Im" provements in apparatus for actuating the points or switches of " railways."

" One end of a rod, which is connected at its other end to the " tongue rail of a switch, is attached by a pin joint at the end of " one arm of a bell crank lever. To the end of the other arm of the " bell crank lever is suspended a weight, which retains the tongue " rail of a switch in a desired position. The weight is con" nected by links to one end of the lever handle, by which the " position of the tongue rail of the switch is reversed; this lever " may be arranged to be moved in any direction or simply on an " axis to move in one direction. The lever handle has on it a " signal plate or disc which when the lever handle is upright in" dicates the position of the tongue rail of the switch, but when " the lever handle is depressed or altered in position into the " horizontal position, the state of the tongue rail of the switch " will be known by the signal plate or disc not being presented to " the driver of a train. The lever handle turns on an axis in lugs " at the top of the box, or it may turn on a universal joint, and " the weight is attached to the lever, so that when at liberty the " lever and the tongue rail of the switch will be brought to and " retained in the desired position."

[Printed, 4*d*. No Drawings.]

A.D. 1866, June 30.—N° 1745.

MACNEILL, Telford.—(*Provisional protection only.*)—" Im" provements in the construction of railway rolling stock, and

" in the permanent way applicable thereto." "This invention
" relates to certain improvements in the construction of railway
" rolling stock and in the permanent way thereto, the object
" being to enable carriages, waggons, and trucks to travel upon
" a mixed or double gauge of rails, that is to say, upon a narrow
" or a wide gauge as required."

Two pairs of wheels are placed on each axle, the broad gauge or external wheels being larger than the narrow gauge or internal wheels. At the junction of the broad with the narrow gauge, " inclines and gradients " are arranged "towards the extremities
" the rails, so that the outer wheels shall gradually be brought
" to bear on the level of the wide gauge rails, thus lifting the
" narrow gauge wheels off their rails, so also with regard to the
" passage from the wide to the narrow gauge, the same method is
" adopted. At junctions, sidings, or points the rails, switches, or
" stationary doubleheaded reversible crossings are likewise formed
" with inclines and gradients to permit the free passage of the
" four wheels over or between the rails."

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 3.—N° 1766.

WOOTTON, Henry.—" Improvements in the construction and
" arrangement of self-acting railway signals."

The inventor describes a system of signalling, the principle of which is that a passing train presses on crank levers placed near the rails, which levers act upon the signals themselves. Signals are also communicated to the train by signal levers on the line acting on apparatus placed on the engine or carriage. He further says—" At those parts of a line at which junctions or sidings
" occur, signal levers, however placed, can be worked in accordance with this invention by simply connecting the signal levers
" with the moving rails or points by means of wires or chains and
" cranks or other analogous contrivances, as well understood."

[Printed, 10*d*. Drawing.]

A.D. 1866, July 12.—N° 1831.

READE, William.—(*A communication from Henry S. Lansdell.*) —(*Provisional protection not allowed.*) — " Improved means of
" and apparatus for supplying water to the tanks of locomotive
" engines and tenders" by means of steam taken from the boiler

of the locomotive. The steam so taken is conveyed through pipes in such a manner that it "induces a current of water to " rise or flow in the direction required, and this without the " intervention of working mechanical parts."

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 13.—N° 1844.

RAMMELL, THOMAS WEBSTER.—" Improvements in pneumatic " railways and in carriages used therein."

In the inventor's former patent dated 10th of February 1860, " double sets of terminal doors are shown applied to single lines " of railway, the embranchment of the ways being effected within " the limits of the tubular way." It is now proposed "to im- " prove the arrangement of those parts by setting the terminal " doors backwards from the station towards the tubular way " sufficiently far (say from 100 to 120 feet) to allow of the em- " branchment of the ways being made between the tubular way " and the platforms of the station, enlarging the covered way (if " any) for the purpose."

Another invention consists in "an improved arrangement for " giving motion to the train at stations, where the train being " whole outside the tubular way the pneumatic pressure cannot " be brought to bear upon it." The ways at the stations are laid on an incline sufficiently steep to start the train on the breaks being released.

The invention also comprises methods of strengthening the exhausting fans by stiffening rings, and of supporting the bearings. The various valves, signals, &c., and the signal room are also described in the Specification. The "sail plate of the piston " carriage" may be contracted or folded up or expanded at the pleasure of the driver, " so as to fill up more or less completely, " as desired, the transverse area of the tubular way."

The permanent way is made up of " iron chairs built into the " brickwork or masonry of the tube, and sufficiently large to con- " tain the rail with packing pieces of wood or other suitable " material beneath it and on both sides. The chair is wedge- " shaped, and has a table to receive the lower packing piece upon " which the rail rests, and by the greater or less thickness of which " its level is determined." This piece is made somewhat elastic, " either by hollowing out the slab of elm or other hard wood

" composing it, or by combining with the piece a layer of cork, " caoutchouc, or other elastic material, or by the use of a steel " spring."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, July 18.—Nº 1875.

LAGARRIGUE, JEAN JOSEPH LOUIS MARIE, and CASTERA, PIERRE ARISTIDE.—" A new or improved mode of actuating " or working the points or crossings of railways so as to dispense " with pointsmen."

The Specification comprises descriptions of various methods of accomplishing this object, which are modifications of the general principle laid down in the patent, namely, that a bar placed between the rails and connected by levers with the point shall be acted upon by shoes or blocks carried by the locomotive and controlled by a hand lever.

[Printed. 10*d*. Drawing.]

A.D. 1866, July 18.—Nº 1877. (* *)

GOAD, JOHN, and GOAD, EDMOND.—" Improvements in mile " posts and other indicators or signs used on railways and other " places."

This consists " in constructing the mile posts of metal or other " suitable material, with the numerals, letters, or other signs " punched or cut through instead of being in relief or in intaglio " as hitherto. The posts may be formed with supports for lamps " behind the punched signs, or lamps may be hung to the posts " so as to come behind the signs, and thus enable them to be " seen at night. The punched signs may be made more conspicuous in the day time by having a dark background formed " behind them."

The patentees also " construct the part of the posts in which " the signs are punched or formed (by preference of galvanised " angle iron) V-shaped in section, the two faces of the V fronting " respectively up and down the line or road; and this part of the " posts may be mounted upon or formed in a piece with rods or " pillars of any desirable form driven into the ground." To maintain the posts in the proper position in loose ground, the patentees " employ supports or steadying pieces, consisting of a " central socket through which the post, pillar, or rod is passed,

" and of four or other desirable number of arms or wings carried " out from the central socket; these arms or plates placed with " one edge uppermost and the lower edge is formed with a flange; " this support is inserted into the ground and the flanges prevent " its being easily pulled out or moved out of position."

[Printed, 8*d*. Drawings.]

A.D. 1866, July 27.—N° 1951.

SEATON, William.—" Improvements in the permanent way " of railways."

The patentee claims,—

1. " Wrought iron longitudinal trough sleepers of a triangular " or equivalent cross section, having a longitudinal channel on " the surface, combined with timber, cork, or other suitable " material placed in such channel, and serving as the immediate " support of the rail."

2. " A new form of rail joint." The inventor cuts out "a " small section of the web of the rail at each end " and inserts " a solid square of metal in support of both rails," which is " kept in its place " by means of two side plates," secured by nuts and bolts.

3. " Constructing the holes for the bolts or trenails in railway " chairs and flat-bottomed rails in an oblique direction, so as to " enable the fastenings to be driven into the sleeper obliquely."

4. "The introduction of a slab of wood between the base of a " railway chair and the surface of the sleeper."

5. Lining the interior of railway chairs with cork.

6. " The introduction of angle iron between the under side of " the 'saddle' rail and the top of the sleeper" to obtain an increased bearing surface on the sleeper.

[Printed, 10*d*. Drawing.]

A.D. 1866, July 27.—N° 1952. (* *)

STROUDLEY, William.—" Improvements in the means of and " apparatus for locking facing points or switches of railways."

A slide or lock is applied to the tongue or moveable rail of the main line by which it is held open, and another slide or lock is applied to the tongue or moveable rail of the crossing line, by which it is held shut to the approaching train. These slides are actuated by a " weigh bar " with a short lever to which the wire from the distant signal is attached, so that the "all right" signal cannot be given until the points are quite locked and safe for "the coming train to pass over."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1866, July 30.—N° 1963.

McKENZIE, John, CLUNES, Thomas, and HOLLAND, Walter.—"Improvements in machinery or apparatus for actuating and regulating railway points and signals."

The apparatus consists of a series of hand levers set on fulcrum shafts, passing from end to end of the apparatus. The lower part of the lever works on the fulcrum shaft, "and carries an arm "to which chains or wires or rods to actuate the signals are "attached." "At a distance from the fulcrum each lever has a "stud which traverses the curvilinear surface of a rocking lever "set on another fulcrum; the face of this lever on which the stud "travels corresponds with an arc of a circle drawn from the "centre of the signal lever fulcrum; the rocking lever also has "another arc formed upon its rear, this arc being drawn from "the centre of its fulcrum, whereby it will follow that when the "signal lever is thrown over to actuate the signal the stud will "traverse the slot or arc and prevent the point lever from being "moved, the stud holding up or (as the case may be) down the "rocking lever, so also when the point lever is thrown back its "stud travels down a corresponding slot in a rocking lever and "raises the same so that the rear arc comes up and faces the "stud of the signal lever and prevents it from being moved. "From the rocking levers or quadrants of the point levers a "connection is made to the rocking levers facing the signal lever "studs. Any two or more levers may be made to act upon each "other, and in communication. The extremities of the point "levers have arms for the purpose of attaching rods to actuate "the points."

What is called a "duplex switch balance," is used to compensate for expansion and contraction of the rods caused by temperature.

Another part of the invention relates to a "facing point indi"cating apparatus" which shows a danger signal when "the "point may be only within half an inch of being quite closed, "yet sufficiently open to throw a train off the line."

[illegible]d, 2*s*. Drawings.]

A.D. 1866, August 4.—N° 2015.

VESCOVALI, ANGELO.—(*Provisional protection only.*)—"Improvements in the mode of and apparatus for increasing the "adhesion of locomotive engine wheels to their rails." The use on steep inclines of rails, in weight and depth about double the weight and depth of ordinary rails, in combination with an electro-magnetic apparatus applied to the wheels for the purpose of obtaining increased adhesion.

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 6.—N° 2019.

PARSONS, PERCEVAL MOSES.—(*Provisional protection only.*)—"Improvements in the permanent way of railways and in screw "bolts for the same, which latter are also applicable to other "purposes." These improvements relate, firstly to crossings. The inventor employs "for the point and wing rails, a double-"headed rail, one side of the tables of which is made flat at the "top and square or nearly so at the side, with the corner either "left angular or only slightly rounded." These rails are of steel, hardened and oil tempered. "The point rail is bent and cut to "the proper form with inclined sides, and the side rail which "diverges from it instead of being notched into the point rail "in the ordinary way has its end fitted to and housed under the "table of the point rail in a somewhat similar manner to that prac-"tised" in Wild's patent, No. 11,597, A.D. 1847, and is secured "to it by bolts, rivets, or other suitable fastenings. The point "and wing rails are firmly connected by means of . . . . fishing "blocks, which are placed between the wing rails and the point of "the joint rail, and fit in between their tables, these are secured by "screws, bolts, or other suitable fastenings, and are supported "by the Egypt chair." The improvements relate, secondly, to the tempering of fish plates; and, thirdly, to screw bolts. These bolts are made tubular nearly up to the screwed part, so that while the diameter of the shank of the bolt is equal to the diameter of the screwed part, measured to the top of the thread, the area of the cross section of the shank will be the same as, or rather less than, the area of the section through the screwed part, measured from the bottom of the thread.

[Printed, 4*d*. No Drawings.]

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A.D. 1866, August 17.—Nº 2116.

CLARK, James.—(*Provisional protection not allowed.*)—"Improvements in rails for railways." The inventor proposes to roll rails "in ordinary iron, and upon the surface or surfaces "thereof" to place "a thickness of the material known as "Bessemer steel or metal, which is then rolled around the said "surfaces, and thus affords the finished shape of rail, or the two "rollings may be combined."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 17.—Nº 2120.

BERHARD, Alexander.—(*Provisional protection only.*)—"Improvements in the permanent way of railways."

The chair "is of a triangular sectional form with a broad base, "which rests upon the sleeper." The base is held down by bolts or screws. "The chair terminates at its apex in a rectangular projection, which forms a support for the upper flange "or head of the rail. The said rail is made double headed, the "bearing surface of the heads or flanges being curved." The rail is not secured vertically in the chair, but at an angle. "The "underside of each of the rail heads is formed to fit firmly upon "the top of the projecting piece at the apex of the chair, and a "portion also of the web is formed to bed against the side of "the said projecting piece, a flange or rib being formed on the "exterior of the rail head, which fits the other side of the said "projecting piece. This method of forming the rail prevents "the ends being beaten down and injured by the passage of "heavy trains over the joints, and also affords a means whereby "the said rail is readily and accurately placed in its position "upon the chairs where it is secured by bolts, screws, or other "suitable fastenings, passing through the web of the rail and the "inclined side of the chair."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 23.—Nº 2160.

LIVESEY, James, and EDWARDS, John.—"Improvements "in the permanent way of railways, and signals for working the "same."

The improvements consist—

Firstly, " in forming a sleeper of cast iron for a flat bottom rail; " this sleeper is made with two jaws on one side to overlap the " bottom of the rail, and one jaw on the other side; this the " centre jaw is corrugated to fit into corresponding corrugations " on the key. This sleeper is so formed along the centre that " when the key is driven in the rail bottom is made to yield or " bend downwards, thus allowing the corrugations to pass each " other and hold the key tight."

Secondly, " in forming a chair of cast iron in which a filling " piece is inserted between the rail and the jaw of the chair. A " hollow spike is driven in between the filling piece and the jaw " of the chair, which acting as a spring forces the filling piece " firmly against the rail. In order to remove a chair without " drawing out spikes or bolts, slots are made instead of holes as " at present."

Thirdly, with reference to signal locking apparatus, the inventors claim "the adaptation and application of locking levers" " for the purpose of locking the main levers at the handles or " upper parts, so as to bring the locking gear in sight of the " operator."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1866, August 25.—N° 2185. (* *)

OWEN, WILLIAM LANCASTER.—" Improvements in apparatus " for working switches and signals of railways."

This consists of an improved apparatus in which switches and signals are locked when in certain positions. For this purpose " the several levers work side by side in segmental frames, and " are provided with segmental tail pieces working through slots " in the ends of the frames. These tail pieces are formed to " correspond with the curvature of the segmental parts of the " frames, so that they lie along the same when the levers are in " the forward position. The segmental frames are slotted transversely just in front of the levers when these are in the backward position, and a sliding bolt works backwards and forwards " through these slots, whereby it is made capable of alternately " locking the one lever or set of levers in the one frame when in " its or their backward position, while the other lever or levers is " or are left free to move. By this arrangement if the one lever or set of levers is locked in the backward position as described "and the other lever or levers is or are moved forward, then the "before-described tail piece or pieces in covering the transverse "slots in their respective frames will prevent the sliding bar or "bolt from being moved back out of its position in front of the "first-named lever or levers, and those will consequently be "effectually locked in their backward position when the other "lever or levers is or are in the forward position. If the latter is "or are now moved into the backward position, thus opening the "slots in the frames again, the sliding bar can now be moved in "front of the same, thus locking it or them, while the other "lever or levers is or are now free to move into the forward "position, in which position the tail pieces thereof in their turn "prevent the unlocking of the other lever or levers. In some "cases slots may also be formed in the tail pieces in certain "positions, so that when the levers are moved into such positions "that such slots correspond with those in the frames the sliding "bolt or bolts may pass through them and lock the levers in "such positions."

The inventor claims.—"The described combined arrangement of "switch and signal levers, wherein all such levers are provided with "segmental tail pieces acting in combination with one or more "sliding locking bolts passing through apertures in the framing, "and worked by the hand of the operator in such manner that "the one lever or set of levers is or are locked in its or their "position by means of the tail piece of the other lever or levers "and of the locking bolt or bolts when such other lever or levers "is or are in the corresponding position to that of the first-named "lever or levers, substantially as set forth with reference to the "accompanying drawings."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, August 25.—N° 2189.

GAINSFORD, William Dunn.—(*Provisional protection only.*) —"Improvements in railways and in engines for use thereon." To obtain greater adhesion on railways the inventor employs a flange on each side of the wheel, and "these flanges are inclined "in such a manner that the head of the rail becomes nipped "between them. . . . . In laying railways on a curve," the inventor makes "the head of the rail on one side of the curve

" narrower than the head of the rail on the other side, so that " whilst the double-flanged wheel on one side of the engine is " biting firmly on the broader rail, the narrower rail on the other " side is not bitten by the other wheel." In some cases the railway is laid in the ordinary way, and the double-flanged wheels are so arranged that the driving wheel on one side is able to turn " independently of the one on the other side."

[Printed, *4d.* No Drawings.]

A.D. 1866, August 25.—N° 2193.

PLIMSOLL, SAMUEL.—" Improvements in the means and " apparatus for facilitating and perfecting the unloading of coals " and other goods from railway waggons."

The improvements " consist in the arrangement of a number of " short lines of railway parallel with the branch of the main line " by which the goods are to arrive, each of which is to receive " two, three, four, or more trucks loaded with coals or other " goods in bulk, such short lines of rails having at or near the " one end " apparatus for receiving the coals, " to which point " the trucks are brought in succession to be unloaded. At each " end of these short lines of rails are disposed " transverse lines of rails, at a lower level for traversers to run upon, on which the coal trucks can be traversed. Weighing and screening apparatus are provided.

[Printed, *10d.* Drawing.]

A.D. 1866, August 28.—N° 2214.

BOVILL, GEORGE HINTON.—" Improvements in the manufac- " ture of rails for railways."

"This invention is for a mode of manufacturing rails when " made of combined Bessemer metal and ordinary wrought iron, " and consists in heating the portion of the pile, which is to be " of ordinary wrought iron, to a welding heat, placing it in a " mould, and running molten Bessemer metal to it in the position " that will form the wearing faces of the rails; the molten " Bessemer metal will weld itself securely to the heated face of " the wrought-iron pile, which may then be worked under the " hammer and rolled out into a rail of the required size with the " Bessemer metal on the wearing surfaces."

[Printed, *4d.* No Drawings.]

A.D. 1866, September 6.—Nº 2286.

EDWARDS, John. — (*Provisional protection not allowed.*)— " Improvements in the permanent way of railways."

The improvements " consist in making and applying suitable " supports to the sides of railway rails, whereby less of an expensive metal can be used, and the necessary strength gained by " these supports, which are bolted to the rails at any required " distance to prevent buckling; these supports are made to fit " the sides of the rails and break joint with the rail, thus superceding fishing; also in perforating or cutting out of the web " of the rail pieces of metal, so as to lighten it and still have " sufficient strength to carry the loads; also in making and " applying stays or gauge bars to hold the road to gauge; these " bars are fixed to either the rails or chairs."

[Printed, 4*d*. No Drawings.]

A.D. 1866, September 11.—Nº 2334.

PAGET, Frederick Arthur.—(*Provisional protection only.*)— " Improvements in the connecting parts of machinery and structures liable to impulsive forces."

" The connecting parts, such as bolts and rivets of machinery " and structures, when subjected to impulsive forces are " peculiarly liable to fracture." To obviate this danger the inventor so constructs his improved bolt that " the cross sectional " area of the shank of the bolt " shall be equal " to that of the " threaded portion." This he effects " by forming the shank " hollow, and making the threaded part and the head solid." He also uses in combination with these bolts the cup-shaped washers described in the Specification of his Patent, dated 29th May, A.D. 1865. In the case of fish plates of permanent way he sometimes places " a steel cup washer both underneath " the head and underneath the nut of each " bolt.

[Printed, 4*d*. No Drawings.]

A.D. 1866, September 17.—Nº 2384.

GEDGE, William Edward.—(*A communication from François Guillet.*)—" An improved construction of railway."

The inventor supports the rails on " steel springs coiled spirally " and placed on each side of the way at about one yard from each " other. These springs, the power of which is proportioned to

" the load they are to bear, are enclosed in a cast-iron box (say " three in each box), the top part of which is uplifted by the " springs, and forming but one piece with the chair rises and " descends (according to the load) around the lower part of the " box; the ballast also is suppressed. To prevent any lateral " displacement of the rails they are united by an iron rod fitted " on each side of the way to the chair which carries the rail by " an iron pin, which permits a certain play between the tie rod " and the chair, and renders any rupture impossible."

[Printed, 10*d.* Drawing.]

A.D. 1866, September 21.—N° 2432.

ROCHUSSEN, THEODORE ANTHONY.—" Improvements in con-" structing the permanent way of railways."

This invention relates to that kind of way in which " the rails " are supported longitudinally by means of longitudinal bearers " or supports formed of angle or L iron placed on either side of " each rail." The bolts which pass through the angle iron supports do not pass through the web of the rail, but under it. The rail is held in its place by means of a rib at the top of each angle iron, which rib takes into a groove cut on each side of the web of the rail.

[Printed, 10*d.* Drawing.]

A.D. 1866, September 26.—N° 2491.

CLARK, WILLIAM.—(*A communication from Alfred Ely Beach.*) —" Improvements in the collection and delivery of letters, parcels, " and other freight, and in apparatus for the same."

The object of this invention " is to facilitate the collection, trans-" portation, and delivery of letters, parcels, and other freight, " and the improvements are intended for use more especially in " connection with tubes, in which cars or conveyors or other " receptacles for freight are made to travel." The cars are made with hinged bottoms connected with projecting rods, so that as the car passes the mouth of the shoot into which it is to deliver its contents, the rods come into contact with studs on the way, the valves or hinged portions of the car are opened, allowing the contents to fall out. In a somewhat similar manner letters, &c. may be collected from the pillar and other boxes. Electro-magnetism may be used in connection with the aforesaid stops on the way, so that the discharge of parcels at any particular station may be governed.

[Printed, 1s. 4d. Drawings.]

A.D. 1866, September 28.—N° 2509.

JOHNSON, John Henry.—(*A communication from Benjamin Shiverick and Thomas Lather Calkins.*)—(*Provisional protection only.*)—"Improvements in railway switches."

"The switch rails are hinged at one end to the track, so that "the opposite ends may be moved to coincide with the permanent "rails of the main track, or moved to coincide with the permanent rails of the turn out or siding. Two frog rails are "employed, the one being hinged to the track adjacent to the "permanent rail of the turn out, and the latter hinged near the "same point to the adjacent rail of the main track. These frog "rails are connected together, and can be moved to and fro "simultaneously to a position for opening either the main line "or the turn out. It is important that the switch and frog rails "should be opened simultaneously," and this is effected by a combination of bell crank and other levers worked by a hand wheel. A spiral spring, also in connection with the system, restores the switch and frog rails to their proper positions.

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 13.—N° 2651.

GREENWOOD, Thomas. — (*Provisional protection only.*)— "An improved manufacture of trenail."

The head of the improved trenail is turned round to fit the round hole in the chair, and the remainder is turned with parallel sides and of an oval form in cross section. The traversing cutting tool used in making the trenail leaves "a kind of shallow screw "thread upon the trenails." When the trenail is driven into the hole intended to receive it, "with its larger diameter in line with "the grain of the wood, the shallow thread will become locked in "the softer wood of the sleeper."

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 23.—N° 2735.

NEWTON, Alfred Vincent.—(*A communication from Samuel L. Potter.*) — "Improvements in the manufacture of rails for "railways." Piling rails.

"According to one arrangement two bars of iron, say seven
" inches broad and one and a quarter inches in thickness, form
" the sides of the pile, the interior of which is composed of four
" bars of iron three and a half inches in breadth and one and a
" quarter inches in thickness, and overlying these a bar of steel
" five inches in width and three and a half inches in thickness;
" . . . . the pile thus formed when rolled will produce a rail with
" a steel head and an iron neck and base."

"Another arrangement for the pile is to take three flat iron
" bars of equal dimensions (seven by one and a quarter inches),
" and place them one on the top of the other, and to place four
" narrower bars, two and a half by one inch, on the top bar, the
" outer edges of all the bars being flush. A space will thus be
" formed between the narrower bars to receive the lower part of a
" T shaped steel bar, the head of which extends the whole width
" of the pile. This pile when rolled will produce a rail with the
" whole of the head steel and the neck and base iron."

[Printed, 6*d*. Drawing.]

A.D. 1866, October 26.—N° 2767.

MEAKIN, George Frederick Lee.—"An improved method " of capping old and new rails used on railways and other ways."

This invention consists in capping rails with caps of steel or other hard metal, attached to the rails by screws, nuts, and bolts, or wedged or plugged thereto.

[Printed, 1*s*. Drawings.]

A.D. 1866, October 31.—N° 2826.

PATTERSON, John.—(*Provisional protection only.*)—"Improvements in securing or fastening screw bolts and nuts when " tightened up." "This invention relates to a mode of preventing screw bolts and nuts from working loose after they have " been tightened up, as they are liable to do when subjected to " shocks and vibrations in the rail joints of railways and other " situations."

The patentee makes a washer of thin plate, somewhat larger in diameter than the nut, and after the nut has been screwed up to the washer, a portion of the washer is bent up against one of the sides of the nut, thereby preventing it from turning. The washer is also prevented from turning by having a projecting strip

inches in thickness, tied together by iron rings so as to form a network with which the part of the bank which is to be preserved is covered to preserve it from corrosion."

This "network" is secured to piles at the top and bottom of the bank. "Willows or other bushes may be planted in the interstices between the bricks."

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 14.—N° 2986.

PAGE, THOMAS.—"Improvements in locomotive engines and their permanent ways, applicable for steep gradients and "Alpine locomotion." The object of this invention is to provide permanent way which, together with suitable locomotives, will enable trains to ascend steep gradients.

On the levels the ordinary locomotives and permanent way are used, but at the gradients "a broad tramway of stone, wood, or "other material" is laid down, "such tramway being roughened "or serrated or otherwise surfaced to afford the bite required for "the driving wheels of the locomotive." The driving wheels have peripheries "of wood or other material, adapted to hold or "bite the tram." The locomotive is kept on the tram by means of suitable guide wheels bearing on the inner edges of the rails. Separate locomotives may be used, or the ordinary locomotives may be fitted with additional tram wheels.

[Printed, 6*d*. Drawing.]

A.D. 1866, November 21.—N° 3058.

NEWTON, ALFRED VINCENT.—(*A communication from John Oliver Reilley and Alexander Wiley*).—"Improved machinery for "manufacturing spikes and rivets."

The working of the improved machine is as follows:—A guage advances and determines the length of the piece of iron required, a "moveable side die" grips the iron against a "stationary side "die;" the guage is then retracted, and a cutter advances and severs the piece. The die which bends over the head end to make the hook is then depressed and retracted, after which the pointing die and the header are advanced, and the operation completed. The pointing die, moveable side die, and the header are then drawn back to release the spike, and an ejector pushes it from its bed, whence it falls to the floor.

[Printed, 10*d*. Drawing.]

A.D. 1866, November 24.—N° 3090.

SIEMENS, Charles William.—(*Partly a communication from Dr. Werner Siemens.*)—(*Provisional protection only.*)—" Improvements in the means and apparatus employed for conveying " telegraphic despatches, letters, and other light articles through " tubes."

In the present invention the tube is arranged in one closed circuit, communicating at one point, the central station, with an air pump. At intermediate points in this circuit are the stations, which communicate with the main tube by means of branch pipes. " For receiving dispatches or parcels from the circuit into the " stations a portion of the tube forming the circuit is arranged " similar to a 'switch' on railways, that is, at one point it is " capable of being moved away from the circuit and made to " communicate " with the station chamber. When the communication with the station is so made, the air nevertheless continues to flow through a " by-pass " round the switching point. The momentum of the parcel entering the station chamber is taken up by brushes or compressed air. Hydrogen or light carburetted hydrogen gas may be used in such tubes. Methods of communicating between station and station by telegraphy are described.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 30.—N° 3153.

DAVY, Alfred.—(*Provisional protection only.*)—" Improvements " in chair supports for the rails of railways.' This invention consists in an improved elastic railway chair.

The chair is made by bending a strip of metal, of sufficient breadth for the breadth of the chair, into the shape of a chair, and welding the ends together. Thus the finished chair resembles the ordinary chair in outline, but is not solid. The rail is inserted in the usual way and keyed, and the " greater the weight " placed on the rail the tighter it will be gripped in the chair."

[Printed, 6*d*. Drawing.]

A.D. 1866, December 5.—N° 3202.

and FIRTH, Edward.— (*Provisional protec-*
rovements in railway crossings."
rossing is thus described :—" I form that part
known as the point by the union of two rails,

" which when united resemble the letter V, the point of the " V-piece, which is the width of one rail, I fix securely into an " iron chair; forming a junction with the V-piece in the same " chair, but hinged thereto is a single rail, which I term the " crossing rail, this rail is free to slide from one line of rails to " the other. On the outside of one of the rails, opposite the " point of the V-piece, I fix a lever, one end of which is connected " to the crossing rail and the other to a balance bracket, which " presses against the inside of the rail to which the lever is " attached. When the balance bracket is resting against the rail " the crossing rail is right for one line of roadway, say No. 1; " for the other line of roadway, say No. 2; the wheels, when " passing over the rail, against which the balance bracket rests, " the flanges force the balance bracket off and draw the crossing " rail right for line No. 2; as soon as the wheels have passed " over the balance bracket falls back against the rail and restores " the crossing rail to its first position."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 19.—N° 3334.

BODMER, Rudolph. — (*Provisional protection only.*) — " An " improved method of securing the nuts of bolts."

The invention consists " in splitting longitudinally the whole " or a portion of the screwed part of the bolt, and after the same " has been put in its place, and the nut drawn up as tightly as " may be considered desirable, introducing and driving into the " slit, either in the direction of the axis of the bolt or transversely, " a wedge representing a very slightly inclined plane, so as in a " trifling measure to expand the two halves or parts of the bolt " projecting beyond the nut, and thereby to prevent the nut from " becoming loose through the vibrations caused by the passing " of trains."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 28.—N° 3413. (* *)

THOMSON, William.—(*Provisional protection only.*) — " Improvements in apparatus for actuating the points or switches of " railways."

" One end of a rod, which is connected at its other end to the " tongue rail of a switch, is attached by a pin joint to the end of

" one arm of a bell-crank lever; to the end of the other arm of " the bell-crank lever is suspended a weight, which retains the " tongue rail of the switch in a desired position. The weight " works in the centre of the box, and is connected to the lever " handle, which reverses the position of the switches, by links or " otherwise. By this arrangement the lever handle may be made " to work in any direction by a universal joint, or it may be made " to work in two ways only, at right angles to or parallel with the " switches. The lever handle carries a signal plate or disc, which " indicates the position of the tongue rails of the switch. The " lever handle turns on an axis in lugs at the top of the box, or " it may turn on a universal joint, and the weight is attached to " the lever, so that when at liberty the lever and the tongue rail " of the switch will be brought to, and retained in the desired " position."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 29.—N° 3434.

CLARK, WILLIAM.—(*A communication from Jules Vautherin.*)— " Improvements in fixing rails to the sleepers or permanent way " of railways."

" This invention relates to the means of fixing rails on metallic " sleepers and giving them their proper inclination towards the " inside of the line. This double result is obtained by the em- " ployment of a sole plate and locking parts. The sole plate is wedge shaped, that is, it is flat on its under side and inclined on its upper side, upon which the rail rests. It is made in two pieces and has clamps on the upper and under sides. The upper clamps serve to grasp the rail, the lower clamps work in mortises in the sleeper. A wedge key or cotter driven vertically through the sole plate into the sleeper, serves to compress the two halves of the sole plate, and so causes them to grip the rail firmly between the upper clamps. Various modifications, applicable as well to double-headed as to single-headed rails, are described.

[Printed, 4*s*. 2*d*. Drawings.]

A.D. 1866, December 31.—N° 3439.

LOEDER, WILLIAM.—(*A communication from Gabriel Dümler.*) —(*Provisional protection only.*)—" Improvements in rails and in " part of the permanent way of railways."

The improvements comprised in this Specification may be considered as developed from the system of composite rail patented by the inventor on 29th May 1863 (N° 1350), and the system of permanent way similarly protected by Patent of 16th March 1865 (N° 738). The rail is made in two parts, head and body, "the "object being that the head and body may if desired, be made "of different metal, that breaking joint at different points they "may when combined form a continuous line of rail, that the "ordinary chairs and fish plates may be dispensed with, and "that the head may be removed and replaced without disturbing "the permanent way." The body of the rail may be considered as practically an elongated but not necessarily continuous chair, with one or two jaws to which the head is bolted. The body is secured to the sleeper, and in some cases an elastic substance is placed under the head, between it and the body. The body may be made to serve the part of sleeper as well as chair or rail body. It is also applicable to use with the ordinary double-headed rail.

[Printed, 1*s.* 2*d.* Drawings.]

APPENDIX.

A.D. 1864, April 2.—N° 832.

TISDALE, Charles Darwin.—"Improvements in railways "and the carriages thereof."

"The main purpose" of this invention "is to enable a railway "carriage to be run on either of two railway tracks of different "gauges or widths, and to be changed from one to the other as "occasion may require."

The wheels of the carriage are so contrived that by lateral movement on their axles they are capable of accommodating themselves to the difficult gauges. When in position, after a change, they are locked by a suitable contrivance. In one method of arranging the permanent way, the two gauges are connected by a length of way called "the wheel changing rails," and with the latter, guard rails are combined for the purpose of acting on the wheels and causing them to shift on their axles. A switch and "auxiliary rail" are also added for the purpose of facilitating addition of carriages to a train already on the track. According to another plan, the wheels are shifted by means of an inclined "wheel plane," On one side the wheels remain on a given rail and are kept on by a guard rail; on the other side they run off the rail on to the "wheel plane" and in consequence of the incline, shift on their axles till they correspond with the altered gauge at the other end of the "wheel plane."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1864, December 30.—N° 3243.

SHUFFLEBOTHAM, Enoch.—(*A communication from John King.*)—"Improvements in girders for railways, and for other "purposes."

The invention relates to girders having "top and bottom "members and end stancheons," the whole connected by "diagonal struts and ties," and its object is to dispense with the use of rivets.

Each diagonal acting as a strut consists of two bars, and each tie is one bar, which passes between the other two. The ties and struts are bolted together at their junctions by cast-iron plates on each side, which plates are cored out to fit on to the diagonals. The ends of the diagonals are secured in shoes, the struts resting against abutments, the ties engaging in mortices, and the whole filled in with iron cement. The shoes are bolted to the diagonals. The "stancheons are made of wrought-iron plates, and fitted up "with one top distance piece" "having flanges for connecting" it "to the upper member of the girder. At mid height of the "stancheon a cast-iron distance piece is fitted in the said piece, "forming seats for the diagonal struts and tie bars, and the "bottom ends of the stancheon plates are bolted to a cast-iron "base."

"The cross joists are passed through between the diagonals, "having an iron bearer underneath sitting transversely on the "tie bars. This bearer is made with a raised part in the middle "of its length, to ensure the weight from the cross joists to pass "through the axis of the girder."

The Drawing shows the improvements applied to a railway bridge.

[Printed, 10*d.* Drawing.]

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ERRATA.

Page 23, fifth line from top, *for* " chains " *read* " chairs."

Page 37, line 24 from top, *for* " Is it " *read* " It is."

Page 46, line 18 from bottom, *for* " Kollman Augustus George " *read* " Kollman George Augustus."

Page, 235, line 6 from top, *for* " flesh " *read* " fish."

Page 292, line 7 from top, *after* " 1851 " *add* " dated September 5, 1850 No. 13,246."

Page 354, line 12 from top, *for* " Barraux " *read* " Barroux."

Page 462, line 17 from top, *for* " heat " *read* " head."

Page 509, line 6 from top, *for* " collars " *read* " cottars."

Page 564, line 17 from top, *for* " *Dümbler* " *read* " *Dümler*."

Page 607, line 9 from top, take out comma after " *Philippe*."

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Newbury (*Literary and Scientific Institution*).
Newcastle-upon-Tyne (*Mechanics' Institution*).
——— (*Working Men's Club*).
New Mills, near Stockport (*Mechanics' Institute*).
Newport, Isle of Wight (*Young Men's Society and Reading Room*).
Northampton (*Mechanics' Institute*).
Nottingham (*Free Library*).
——— (*Mechanics' Institution*).
——— (*Subscription Library, Bromley House*).
Odiham (*Mechanics' Institution*).
Oldham (*Analytic Literary Institution*).
——— (*Mechanics' Institution, Werneth*).
Ormskirk (*Public Library*).
Oswestry (*Institute*).
Over, Cheshire (*Working Men's Institute*).
Oxford (North) (*Working Men's Club*).
Patricroft (*Mechanics' Institution*).
Pembroke Dock (*Mechanics' Institute*).
Pendleton (*Mechanics' Institution*).
Penryn (*Working Men's Club and Reading Room*).
Perth (*Mechanics' Library, High Street*).
Peterborough (*Mechanics' Institution*).
Plymouth (*Working Men's Institute*).
Poole (*Literary and Scientific Institution*).
——— (*Mechanics' Institute*).
Portsea (*Athenæum and Mechanics' Institution*).
Preston (*Institution for the Diffusion of Knowledge*).
Rawtenstall (*Mechanics' Institution*).
Reigate (*Mechanics' Institution*)
Retford (*Literary and Mutual Improvement Society*).
Richmond (*Working Men's College*).
Rotherham (*Rotherham and Masbro' Literary and Mechanics' Institute*).
Royston (*Institute*).
Ryde, Isle of Wight (*Literary and Scientific Institution*).
——— (*Philosophical and Scientific Society*).
Saffron Walden (*Literary and Scientific Institution*).
St. Just (*Institution*).
St. Leonard's (*Mechanics' Institution*).
Salford (*Working Men's Club*).
Saltaire (*Literary Institute*).
Selby (*Mechanics' Institute*).
Sevenoaks (*Literary and Scientific Institution*).
Shaftesbury (*Literary Institution*).
Sheffield (*Branch Free Library*).
——— (*Brightside Branch Library*).
——— (*Literary and Philosophical Society, School of Arts*).
——— (*Mechanics' Institution*).
Sidmouth (*Mechanics' Hall*).
Skipton, Yorkshire (*Mechanics' Institute*).
Slough (*Mechanics' Institute*).
Smethwick, Staffordshire (*Library, Reading Room, and Literary Institute*).
Southampton (*Hartley Institution*).
——— (*Polytechnic Institution*).
——— (*Workmen's Hall*).
Southport (*Athenæum*).
South Shields (*Working Men's Institute and Club*).
Southwell (*Literary Institution*).
Spalding (*Mechanics' Institute*).
——— (*Christian Young Men's Association*).
Staines (*Literary and Scientific Institution*).
——— (*Mechanics' Institute and Reading Room*).
Stalybridge, Cheshire (*Mechanics' Institution*).
Stamford (*Institution*).
Stourbridge (*Associated Institute*).
——— (*Church of England Association*).
——— (*Iron Works Reading Room and Library*).
——— (*Mechanics' Institution*).
——— *Working Men's Institute*).
Stratford (*Working Men's Hall*).
Sudbury, Suffolk (*Literary and Mechanics' Institute*).
Sunderland (*Working Men's Club*).

Swansea (*Royal Institution of South Wales*).
—— (*Working Man's Institute*).
Tavistock (*Mechanics' Institute*).
—— (*Public Library*).
Thornton, near Bradford (*Mechanics' Institute*).
Thornton Heath, Croydon (*Workmen's Club*).
Todmorden (*Mechanics' Institution*).
Truro (*Cornwall County Library*).
—— (*Institution*).
—— (*Royal Institution of Cornwall*).
Tunbridge (*Literary and Scientific Institute*).
—— (*Mechanics' Institute*).
Tunbridge Wells (*Mechanics' Institution*).
—— (*Society of Literature and Science*).
Turton, near Bolton (*Chapel Town Institute*).
Tynemouth (*Free Public Library*).
Ulverston (*Temperance Hall*).
Uttoxeter (*Mechanics' Literary Institute*).
Wakefield (*Mechanics' Institute*).
Wallingford (*Free Library and Literary Institute*).
Walsham-le-Willows, Suffolk (*Institute*).
Ware (*Institute*).
Warminster (*Athenæum*).
Watford (*Literary Institute*).
Wells, Somerset (*Mechanics' Institution, Grove Lane*).
—— (*Young Men's Society*).
Wendover (*Literary Society*).
Whaleybridge (*Mechanics' Institute*).
Whitby (*Institute*).
—— (*Museum*).
—— (*Subscription Library*).
Whitehaven (*Mechanics' Institute*).
—— (*Working Men's Reading Room*).
Whitstable (*Institute*).
Wilton (*Literary Institute*).
Winchester (*Mechanics' Institution*).
Wisbeach (*Mechanics' Institute*).
Witham (*Literary Institution*).
Wolverhampton (*Law Library*).
—— (*Library*).
Wolverton (*Institute*).
Woodbridge (*Literary and Mechanics Institute*).
—— (*Working Men's Hall*).
Worcester (*Railway Literary Institute*).
—— (*Workman's Hall*).
Workington (*Mechanics' Institution*).
Yeovil (*Mutual Improvement Society*).
York (*Church Institute*).
—— (*Institute of Popular Science, &c.*)
—— (*Railway Library*).

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Birmingham (*Institution of Mechanical Engineers, Newhall Street*).
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Cambridge (*Free Library, Jesus Lane*).
Cardiff (*Free Library and Museum*).
Chester (*Mechanics' Institute, St. John Street*).
Coalbrookdale (*Literary and Scientific Institution*).
Coventry (*Watchmakers' Association*).
Darwen, Over (*Free Public Library*).
Dublin (*Dublin Library, D'Olier Street*).
Edinburgh (*Horological Society*).
Ennis (*Public Library*).
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Ipswich (*Mechanics' Institute, Tavern Street*).
Kew (*Library of the Royal Gardens*).
Kington, Herefordshire (*Reading Institute*).
Leominster (*Literary Institute*).
London (*House of Lords*).
—— (*House of Commons*).
London (*Hon. Soc. of Gray's Inn*).
—— (*Hon. Soc. of Inner Temple*).
—— („ „ *Lincoln's Inn*).
—— („ „ *Middle Temple*).
—— (*Aeronautical Society*).
—— (*Athenæum Club, Pall Mall*).
—— (*British Horological Institute*).
—— (*General Post Office*).
—— (*Institution of Civil Engineers*).
—— (*Odontological Society*).
—— (*Royal Society*).
—— (*United Service Museum*).
Manchester (*Literary and Philosophical Society, George Street*).
—— (*Mechanics' Institution, David Street*).
Newcastle-upon-Tyne (*North of England Institute of Mining Engineers*).
Oxford (*Bodleian Library*).
Stretford, near Manchester (*Mechanics' Institute*).
Swindon, New (*Mechanics' Institute*).
Tamworth (*Library and Reading Room, George Street*).
Yarmouth, Norfolk (*Public Library, South Quay*).

British Colonies and Foreign States.

British Columbia—Mechanics' Institute, Victoria.
——— Public Library, New Westminster.
France—Academy of Science, Paris.
Germany — Kaiserliche Universitäts und Landes-Bibliothek, Strasburg.
Netherlands—Bibliothèque de l'Ecole Polytechnique de Delft.
Russia—Imperial Technological Institute, St. Petersburg.
Smyrna—Literary and Scientific Institute.
United States—American Academy of Arts and Sciences, Boston.
——— American Institute, New York.
United States.—American Society of Civil Engineers, New York.
——— Industrial University, Champaign, Illinois.
——— Mechanics' Institute, San Francisco.
——— Mercantile Library Association, Pittsburgh, Pennsylvania.
——— Odd Fellows' Library Association, San Francisco.
——— Smithsonian Institute, Washington.
——— Wabash College, Indiana.
——— Young Men's Christian Association, Scranton, Pennsylvania.

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